THE COMPLETE SKI-RUNNER

ARNOLD LUNN

Frederick Lindall.

Brighton.

May 1880.

THE COMPLETE SKI-RUNNER

BY THE SAME AUTHOR

A HISTORY OF SKI-ING
ALPINE SKI-ING AT ALL HEIGHTS AND SEASONS
SKI-ING FOR BEGINNERS
THE ALPINE SKI GUIDES TO THE BERNESE OBERLAND

THE MOUNTAINS OF YOUTH
OXFORD MOUNTAINEERING ESSAYS (edited)
THE ALPS
THE ENGLISHMAN IN THE ALPS (ANTHOLOGY)
SWITZERLAND. HER TOPOGRAPHICAL, HISTORICAL AND LITERARY LANDMARKS

THE HARROVIANS
LOOSE ENDS
ROMAN CONVERTS
THINGS THAT HAVE PUZZLED ME
JOHN WESLEY
THE FLIGHT FROM REASON
AUCTION PIQUET

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THE ROBERTS OF KANDAHAR RACE, 1927

("SHAMBLES CORNER")

H. FORD, J. JOANNIDES, C. MACKINTOSH, W. RIDDELL

THE COMPLETE SKI-RUNNER

BY

ARNOLD LUNN

PRESIDENT OF THE SKI CLUB OF GREAT BRITAIN
(1928–1930)

WITH TWENTY-ONE ILLUSTRATIONS
AND THIRTY DIAGRAMS

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TO

A. G. SENTANCE TAPP

PRESIDENT
OF
THE KANDAHAR SKI CLUB
1928 TO 1930

PREFACE

THIS book owes its title to the fact that it is appearing in a well-known series of treatises on our national sports and games, a series which includes *The Complete Yachtsman*, *The Complete Golfer* and *The Complete Mountaineer*.

Is ski-ing entitled to rank among our national sports? I think so. The recent revival of the Scottish Ski Club is a timely reminder that abundant opportunity for ski-ing may be discovered by the keen ski-runner in the British Isles. The modern skier who has learnt to tackle difficult snow can enjoy ski-ing in the Scottish Highlands from November until April.

Again, if numbers be any criterion, ski-ing commands an army of enthusiastic supporters at least as great as that of many sports which are accepted without question as part and parcel of our national heritage.

I have called the book *The Complete Ski-Runner*, not *The Complete Skier*. The "complete" skier must know something of ski-jumping, ski-mountaineering and langlauf racing, none of which are discussed in this book.

The word "ski-running" has gradually acquired the restricted sense of downhill ski-ing. The British Ski-running Championship, to quote the official

title, is awarded on downhill ski-racing alone. The Ski Club of Great Britain again divides its tests into ski-running and ski-jumping tests, and the former are confined to the technique of downhill ski-ing.

The moment seems to be auspicious for a book attempting to deal exhaustively not only with downhill ski-ing, but also with the special problems of downhill racing on skis. As the result of the International Congress which met at Oslo in February 1930, downhill ski-racing has at last come into its own. Until 1930 the International Championship Meetings included only long-distance races and jumping competitions. Downhill racing remained the Cinderella of competitive ski-ing until the long campaign initiated by British skiers was carried to a successful conclusion at Oslo. At Oslo last February, the rules for downhill and slalom racing were officially incorporated in the International Racing Rules. Next winter the Ski Club of Great Britain is to have the honour of organizing a downhill and slalom racing championship, the first held under the auspices of the International Ski Federation.

It is, of course, almost impossible to become a first-class ski-runner without racing.

Mr. Bracken, the present holder of the British Ski-running Championship, writes as follows in the *British Ski Year Book* (v. p. 164) :

" In 1925 I came to Mürren to try my hand at racing with indifferent success ; but what impressed itself upon my mind was the fact that (*a*) I

had never gone fast before, and (*b*) when I did go fast I had no control. Dr. Walter Amstutz took me down the south slopes at Mürren which are steep and wooded. I say he took me down, but actually we started together, and I never saw him again after the first three seconds until I saw him going up in the next train when I was still half-way down. This gave me a nasty jar, and I determined to start to learn to ski. Next season I was unable to go to Mürren, so I started to learn by making myself a slalom and reducing my time on it, which after three weeks I did by half my original time."

A friend of Mr. Bracken, who had skied with him for years at Kitzbühel, told me that a single season of Mürren racing transformed Mr. Bracken from a good cross-country runner into a runner of the champion class. "Before Mr. Bracken began to race," my friend added, "I had no difficulty in keeping up with him on tour. Next winter I never saw him once we started down, excepting when he chose to stop and wait for me to come along."

It is not, of course, necessary to be a champion in order to enjoy and to profit by racing. More than fifty races are held every winter at Mürren and at an increasing number of other centres, notably at Wengen; and a large proportion of these races are reserved for second and third-class ski-runners.

The novice should start racing almost as soon as he can manage a short day's tour. A mixed diet of straight racing, slalom racing and no-fall racing is the ideal prescription for a keen beginner.

Jumping, which does not feature in this book, is also an admirable training for straight racing. Thanks very largely to the enthusiasm of my friend Mr. Alec Keiller, and of the British Ski-jumping Club which he founded, jumping is becoming more and more popular with British skiers.

I put on my first pair of ski in 1898, since when I have missed few winters on the snows. I have visited most of the great ski-ing centres of Scandinavia and Central Europe, and have been able to study on the snow the methods of many of the greatest masters of downhill ski-ing.

I have had the pleasure of discussing problems of ski technique with Herr Hannes Schneider, the founder of the famous Arlberg school. In criticizing the tenets of his school, it is perhaps inevitable that the points on which we differ should be emphasized, and I should therefore like to take this opportunity of recording my admiration for Herr Schneider both as a ski-runner and as a ski-teacher. He has a most engaging personality and a genius for teaching. I am proud of the fact that the Arlberg Ski Club elected me an honorary member, and I hope that my obstinate heresy in the matter of the telemark turn will be condoned by my many friends at St. Anton. The Kandahar Club and the Arlberg Club are linked together by many ties. Herr Schneider was one of the first of the Central European runners to insist that the langlauf, in which he has scored many notable successes, is no test of downhill ski-running. The Arlberg-Kandahar race, which owes its existence to the Kandahar Ski Club, and its

prestige as the greatest of all International downhill racing events to the admirable organization of the Arlberg Ski Club, focussed the attention of Central European runners on downhill racing at a critical moment in the campaign.

The man who aspires to teach by the written word will do well to serve an apprenticeship as a teacher by word of mouth, and those who have tried to help beginners on the snow enjoy unrivalled opportunities for testing out the value of rival theories of ski technique.

I spend my winters at Mürren, the head-quarters of two clubs, the Kandahar Ski Club, which is a racing club, and the Lone Tree Club, which exists to provide instructions for beginners. The daily instruction runs are in charge of my friend Mr. W. R. Bracken, but whenever I can spare the time I give a hand, partly because I enjoy teaching, and partly for selfish reasons ; since teaching helps one to clarify one's own ideas on technique.

I have devoted the concluding chapters to ski-racing. These chapters summarize experience gained partly as a racer, and partly as an organizer of races. I suppose I may claim to be the putative father of the slalom in its modern dress, for the modern slalom was evolved at Mürren in Kandahar races. I hope that the chapter on " How to Set a Slalom " may prove of interest to some, at least, of my readers.

In my opening chapter I have described the differences between Alpine and Scandinavian ski-ing, and I hope that this chapter may prove of interest to American and Canadian readers whose countries

are Scandinavian rather than Alpine in character, and who, like the Swedes, have been quick to appreciate the fact that the technique of downhill running can be developed by means of the slalom even in undulating ski-ing country devoid of long, unbroken descents.

I have not attempted in this book to deal with problems of snowcraft, which is the subject of my book *Alpine Ski-ing at all Heights and Seasons;* for a descriptive rather than a technical description of ski-mountaineering I may perhaps be allowed to refer the reader to my book *The Mountains of Youth* (Oxford University Press).

My thanks are due to all those who have kindly permitted me to make use of photographs of which they own the copyright. The names of those to whom I am indebted for my illustrations will be found in the List of Plates on page xv. I am also greatly indebted to my friends Mr. Bedford Russell and Captain de Gennes, who read the proofs and helped me with many suggestions.

ARNOLD LUNN

May 1st, 1930

CONTENTS

CHAPTER		PAGE
	PREFACE	vii
I.	ALPINE AND SCANDINAVIAN SKI-ING	1
II.	EQUIPMENT	20
III.	FUNDAMENTALS	38
IV.	THE "FORWARD KNEE"	47
V.	THE GENERAL PRINCIPLES OF STRAIGHT RUNNING	52
VI.	STRAIGHT RUNNING—DETAIL	66
VII.	THE FUNDAMENTAL PRINCIPLES OF SKI-TURNING	74
VIII.	CHOICE OF TURN	79
IX.	STEMMING	88
X.	THE TELEMARK TURN	97
XI.	THE CHRISTIANIA SWINGS	114
XII.	THE JUMP-TURN	133
XIII.	STICK-RIDING	141
XIV.	SKI-LAUFING	150
XV.	HINTS ON RACING	155
XVI.	THE RELATION OF SKI-RACING TO SKI-RUNNING	164
XVII.	HOW TO SET A SLALOM	185

LIST OF PLATES

THE ROBERTS OF KANDAHAR RACE, 1927 . . *Frontispiece*
(*Photo: C. E. Brown*)

FACING PAGE

FIELD JUMPING 32
(*Photo: Sport and General*)

TOE SPIN AND "SPLITS" 42
(*Photo: Amstutz*)

CORRECT POSITION FOR TRAVERSING 42
(*Photo: Amstutz*)

THE FORWARD KNEE: NEUNER IN THE ARLBERG-KANDAHAR 48
(*Photo: Sauer, St. Anton*)

THE FORWARD KNEE: G. REUGE RACING AT WENGEN . 48
(*Photo: W. Gabi*)

THE FORWARD KNEE 50
(*Photo: Sport and General*)

CROUCH VARIATIONS, ARLBERG-KANDAHAR, 1930 . . 52
(*Photo: B. von Biringshofen*)

STRAIGHT RUNNING POSITIONS: H. SCHNEIDER . . 56
(*Photo: A. H. d'Egville*)

C. E. MACKINTOSH 56

STRAIGHT RUNNING 60
(*Photo: "The Times"*)

STARTING A STEM TURN 92
(*Photo: A. Lunn*)

THE FINISH OF A STEM TURN 92
(*Photo: A. Lunn*)

THE FINISH OF A CHRISTIANIA IN SOFT SNOW . . 114
(*Photo: Sport and General*)

PREPARING FOR THE LIFTED STEM 120
(*Photo: Amstutz*)

LIFTED STEM, HALF-WAY ROUND 120
(*Photo: Amstutz*)

FACING PAGE

THE FINISH OF A CHRISTIANIA 126
(*Photo: "The Times"*)

A JUMP-TURN BY W. AMSTUTZ 134
(*Photo: Central Press*)

THE DOUBLE-STICK JUMP-TURN 138
(*Photo: H. R. Spence*)

"STEPPING OUT" 160
(*Photo: Sport and General*)

THE ROBERTS OF KANDAHAR RACE, 1930 . . . 176
(*Photo: C. E. Brown*)

THE COMPLETE SKI-RUNNER

CHAPTER I

ALPINE AND SCANDINAVIAN SKI-ING

A COMPARISON AND A CONTRAST

FOR reasons which I have explained in the preface, I propose to devote this, my first chapter, to show the fundamental differences between Alpine and Scandinavian ski-ing.

My task will be easier if I begin by explaining the difference between those two forms of ski-ing which the Germans describe as "*ski-fahren*" and "*ski-laufen*" respectively. By "ski-fahren" the Germans mean downhill ski-ing, and by "ski-laufen" they mean ski-ing along the level and uphill.

Ski-running is the exact equivalent of the German word "ski-fahren," but unfortunately we have no good equivalent for "ski-laufen." It has been proposed to anglicise this word, and to use ski-laufing as the equivalent for "ski-laufen."

Ski-ing, if this classification is accepted, can be divided into *ski-running*, by which I mean downhill ski-ing, *ski-laufing*, by which I mean level and uphill ski-ing, and *ski-jumping*, which calls for no explanation.

There are steep slopes in Scandinavia, just as there are gradual slopes in the Alps, but in the main

Scandinavia is a ski-laufing just as Switzerland is a ski-running country. The technique of ski-laufing and of ski-jumping has been brought to the highest point of efficiency in Scandinavia. The technique of ski-running has evolved in Central Europe and in Alpine countries very rapidly.

It is, of course, only recently that the distinction between Alpine and Scandinavian ski-ing has been made clear. Even to-day there are thousands of Norwegians who would be amused or annoyed if you implied that though the Norwegians undoubtedly lead the world in ski-jumping and ski-laufing, they have much to learn so far as ski-running is concerned from Central Europeans.

In Norway, championships are decided on the combined result of a langlauf and a jumping competition. The Central Europeans followed the Norwegian precedent blindly without realising that neither the langlauf, still less the jump, were any adequate test of Alpine ski-ing in general or of ski-running in particular.

In 1921 the Ski Club of Great Britain, which had previously followed the Norwegian precedent, decided to award their championship on a downhill race. In 1924 the Kandahar Ski Club was founded at Mürren with the express object of developing downhill ski-racing. Downhill races are divided into "straight races" which are primarly a test of straight running, and "slalom races" which are primarly a test of turning. On the former competitors are usually free to pick their own line; on the latter the course is defined by flags.

The first international meeting, organised at Mürren on January 10th, 1924, a fortnight before the foundation of the Kandahar Ski Club, was decided on the

combined result of a straight race and slalom, for a Cup. This event was a great success, and Dr. Walter Amstutz, who was then a student at Bern, was so impressed that he took steps to found the Schweizerischer Akademischer Ski Club with the express object of developing downhill and slalom racing among the Swiss. In January 1925 the first international team race, to be decided on a straight race and slalom race, was held at Mürren, the teams representing Great Britain and the Schweizerischer Akademischer Ski Club respectively. Next year both the British and Swiss teams were composed entirely of university ski-runners, and the annual match between the British and Swiss University Ski Clubs has now been held on six occasions. Both sides have three victories to their credit.

The Schweizerischer Akademischer Ski Club, hereinafter called the S.A.S., also organized a series of international university championships which has had far-reaching effect in the campaign for the recognition of downhill races. *Der Schneehase*, the admirable publication of which Dr. Amstutz is the Editor, provided in the German language the counterpart of *The British Ski Year Book*, and like *The British Ski Year Book* continued to plead for the recognition of downhill racing.

The present writer, as the representative of the Ski Club of Great Britain, formally proposed at the International Ski Congress which was held at St. Moritz in January 1928 that the British Rules for downhill racing should be adopted. Thanks to the intervention of Dr. Roesen, the German delegate, and of Count Bonacossa, who represented Italy, the International Ski Federation decided to give these rules a tentative trial, and the various nations

present were asked to report to the Congress which was to meet at Oslo in 1930. In 1929 the Polish Ski Association was entrusted by the International Ski Federation, hereinafter called the F.I.S., with the organization of the first International Ski Championship Meeting held under the auspices of the F.I.S., and included a downhill race in their programme. The British entered a team and W. R. Bracken only just failed to win the race by two seconds. There were sixty competitors for this event, W. R. Bracken finished second, Guy Nixon sixth, W. J. Riddell eighth, F. Pelham Maitland tenth. E. W. A. Richardson twelfth, Miss Doreen Elliott thirteenth, Miss Sale-Barker fourteenth, and Harold Mitchell, who broke a ski near the top of the second half of the race, twenty-fourth. Miss Elliott and Miss Sale-Barker had been entered for the open event, and their performance in beating forty-five men competitors must rank, to quote *The Times*, as " one of the finest achievements of women in any form of sport."

In 1928, thanks to the co-operation of the Arlberg Ski Club and the Kandahar Ski Club, the Arlberg-Kandahar race, decided on the combined result of a straight race and a slalom race, was first held at St. Anton. This event is far and away the most important meeting of its kind on the Continent, and continues to attract an amazing entry.

The Americans and Canadians, meanwhile, were introducing slaloms into the American continent, and the Austrian Ski Association was lending its powerful support to the campaign. Count Hamilton, the Honorary Secretary of the International Ski Federation, a distinguished Swedish ski-runner, visited Mürren, and became an ardent and most

valued ally of those who were fighting for the recognition of downhill races. Herr Erb, the Editor of *Sport*, and Herr Luther, Editor of *Der Winter*, lent their powerful support to the cause.

In February 1930 the long and hard fight was at last crowned with success. The present writer, representing the S.C.G.B. at Oslo, had the satisfaction of securing unanimous support of the proposal officially to recognize the rules for straight and slalom racing. These rules were, in effect, the British Ski Racing Rules, with a few modifications suggested by the S.A.S. The International Rules represent, in the main, the results of experience gained by the Kandahar Ski Club of Mürren in something like 200 races, and by the S.A.S. in the international university meetings which they have organized.

Such, in brief, is the story of the campaign which has lasted for many years. I believe that downhill racing is destined to play in Alpine country a rôle equal in importance to langlauf and jumping in Scandinavia. To justify this belief it is necessary to analyse in some detail the essential differences between Scandinavian and Alpine ski-ing.

The International Ski Congress at Oslo, at which downhill racing was officially recognized, was held at the same time as the International Championship which attracted a magnificent entry, not only from Scandinavia, but also from Central Europe.

Thanks to the thoughtfulness of Captain Oestgaard, the President of the Norwegian Ski Association, and to the kindness of two young Norwegians, Mr. Horn and Mr. Wahlstrom, who were good enough at Captain Oestgaard's suggestion to pilot me along

the 17-kilometer course, I had exceptional opportunities of studying the world's greatest langlauf experts at work. I followed the course for about five kilometres, cut across to the homeward track, and then followed the last five kilometres of the course back to the finishing posts.

I watched all the competitors at two points, the first on the outward and the second on the homeward journey. I saw them not only along the level, but also at one of the steepest downhill sections of the course.

I was curious to see the course, because Captain Oestgaard had contrasted the Swiss courses at the St. Moritz Games unfavourably with the Norwegian courses. The former, he explained, contained much too much flat running. There was certainly more flat in the St. Moritz courses, but the downhill portions were, I think, slightly less indequate as a test of downhill ski-ing than the downhill sections on the Holmenkollen course.

The charm of Alpine ski-running is partly due to its variety, and partly to the necessity of mastering the varying snow surfaces of an Alpine run. Hard snow is, of course, the easiest of all ski-ing surfaces, easiest and safest, for bad accidents occur in the main in soft snow or breakable crust. The main difficulty about ski-ing is to cope with changes of speed, when running for instance from hard into soft snow, or from fast snow into sticky snow. Langlauf ski-ing is track racing, usually in hard, icy tracks which do not change in speed. Speed in itself is not particularly difficult, it is change of speed which is the trouble.

I am told that the conditions round Holmenkollen for these races were quite exceptionally trying owing

to the poor winter. Certainly, the tracks through the wood were bumpy, icy, and called for good balance, but I saw nothing on these langlauf courses which a second-class Alpine ski-runner could not run straight without the least fear of a fall. The distinguishing mark of a good Alpine runner is that he is able to descend a slope too steep to be taken straight, in fast, sweeping downhill turns. One of the most difficult things in ski-ing is to take a steep slope of deep snow in a succession of rapid "tail-wagging" turns. This branch of ski-ing technique is, of course, not tested at all in the Holmenkollen langlauf. I did not see a single point on the course where a downhill turn was either necessary or indeed practicable. Nor did it call for the least knowledge of snowcraft. The Kandahar course provides a racer with several varieties of snow: snow lightly touched by the wind, deep, heavy snow varied with hard beaten crust. A man need know nothing about snow to win a normal langlauf race. Again, one of the great joys of Alpine ski-ing is the joy of picking out a good line. The day before the Roberts of Kandahar race one often sees competitors studying the line from Broody Bump, at which point there are at least half a dozen practicable lines, down to Martha's Gate. Langlauf racing is track racing. You put your ski in their tracks and wait for them to stop, there is only one possible line to follow.

In brief, the langlauf, as we have always contended, either at Holmenkollen or elsewhere, is a magnificent test of langlauf technique, of endurance and of stamina, but is in no sense whatever a test of downhill ski-running as we understand that term in the Alps.

The contrast between the Scandinavian and the

Central European competitors in this langlauf was most marked. The Scandinavians looked absolutely different. There was no mistaking the rhythm and ease of their movements, and compared to them the best Central European runners looked distinctly clumsy. The Scandinavians certainly made the best of the down-hill sections. Some of them put their sticks together and braked on these runs. But this was rare, and the better Norwegians showed marvellous skill in cutting the corners, racing round at high speed, thereby saving seconds. This does not, of course, have much effect on the final results. The aggregate vertical descent of these downhill sections is hardly more than an aggregate vertical descent of the shorter racing course at Mürren for which the record stands at 1 minute 32 seconds. I doubt if it would be possible for the best downhill runner in this race to gain more than thirty seconds at the outside from a very average performer. As the race lasts for more than an hour, and as this particular race was won by a bigger margin than thirty seconds, I imagine that the downhill sections of the course had a very minor effect on the result.

A langlauf race is interesting, but not particularly thrilling, as a spectacle. One admires the rhythm and endurance of the competitors, but one does not gasp with astonishment as one does when a man dashes down a steep hill-side. The langlauf lacks élan. The difference between downhill racing and langlauf racing is the difference between an Evans gambit and the Queen's pawn game, between a Morphy " brilliancy " and the positional play of a Capablanca.

Among the finest ski-ing sights that I have ever seen, two stand out supreme : the sudden vision of

twenty-eight good racers racing in line down the Schiltgrat to Shambles Corner in the Kandahar race of 1929, the snow thrown up by their ski sparkling in the light of the low-lying sun ; and Tullen Thams jumping on the Olympia Schanze.

Ski-ing in Norway is, of course, not confined to Holmenkollen and the Nordmarken. At Finse and in the Jotunheim you find ski-ing very much more Alpine in character. I first visited Finse in 1909, a few days after the hotel had been opened for the first time to visitors. I revisited Finse in 1930 during the International Congress.

As I stepped out of the train, a very experienced Swedish runner who has skied all over Scandinavia and also in Switzerland drew my attention to the tracks. " Note the contrast," he said, " between Alpine and Scandinavian ski-ing. Observe that there are no tracks on the steep slopes, no tracks of stunt straight runs, no slalom tracks. All the tracks are straight lines running down the gradual and traversing across the steeper slopes." My friend added that in the Jotunheim the slopes are steeper than at Finse, but that in the Jotunheim, as at Finse, most Norwegian runners avoid the steeper slopes where downhill turning would be necessary, and stick to slopes where typical ski-laufing technique can be applied. Of course there are steep runs near Finse, an admirable ski-ing centre in every way, but the point is that the visitors to Finse apparently lack any desire to seek out steep slopes for the fun of mastering the characteristic Alpine technique. In this, as we shall see, they differ from the more enterprising Swedish visitors to Storlien.

Few people learn things just for the fun of learning them. Human nature being what human nature is,

one generally only begins to think about a new and troublesome accomplishment when it is, on the balance, more trouble to remain ignorant than to get down to the job of acquiring new knowledge. The Alpine technique of controlling the ski by means of downhill turns on steep and difficult ground is of value in the Alps, but is in the nature of a graceful accomplishment in Norway. At Finse you just put your ski together and wait until they stop. You might ski for years in Norway without ever feeling the need to do a downhill turn.

The Norwegian, therefore, whose ski-ing has been confined to Scandinavia, may be pardoned for his parochial belief that a branch of ski technique which is unnecessary in Norway is equally useless elsewhere. Thus Mr. Poulsen, an expert langlaüfer and ski-jumper, who has skied in Norway and also in the United States where ski-ing is Norwegian rather than Alpine in character, describes the telemark and christiania in his book *Ski-ing* as "fancy manœuvres which are not absolutely necessary for the equipment of even a good cross-country runner or ski-jumper." I agree—in Norway. But in the Alps, a skier who could not turn would be an infernal nuisance on a cross-country tour. He would be reduced to kick-turns on steep slopes or falling, while his companions slid merrily away down to the valley below. Put a Norwegian who has only skied in Norway on steep ground, say the classic Kandahar course at Mürren, where the slopes are steep and broken and the snow usually difficult, and he is at once reduced to kick-turns. Many years ago I had the pleasure of taking three Norwegians, all of whom were good ski-laufers and ski-jumpers, on their first run at Mürren. None of them had skied in the Alps

before. My other companions were three first-class British runners who were much surprised to discover that they were waiting at the bottom of the slope while the Norwegians were still kick-turning far above. Of course, a good ski-laufer and jumper possesses all the qualities necessary to make a good ski-runner, and before a fortnight had passed our Norwegian friends were doing downhill turns with the best.

I got into trouble some little time ago for hinting that there were a good many Norwegian ski-laufers who were very poor ski-runners. I am glad, therefore, to quote Mr. Poulsen in unconscious support of this point of view. "In Norway," he writes, "the home of ski-ing, you can take veteran ski-runners out on to a hill and ask them to do a telemarken or christiania swing for you and they will make a very poor showing." Precisely. They have mastered the ski-laufing technique without acquiring the alphabet of ski-running. (Mr. Poulsen, of course, writes "ski-runner" where I should use the word "ski-laufer").

A good langlaüfer may be and, of course, often is a good ski-runner, but he is a good ski-runner in spite or rather than because of his training as a langlaüfer. There is no escaping from the dilemma of the langlauf. Either the downhill sections are steep and difficult, in which case the competitors brake with their sticks, or the downhill sections are easy, in which case they are not an adequate test of ski-running technique. That great langlauf racer, Peter Oestbye, who won the German Ski Championship in 1912, who has competed with success in many Holmenkollen races, and who invented the famous wax which bears his name, will be accepted as a reliable

witness by our Norwegian friends. And this is what he says : " If those who organize the Holmenkollen races adhere to the principle that the langlaüfer must also demonstrate his mastery of stick-riding, it is my right and duty to protest."[1] Oestbye then proceeds to contrast the old langlaufs which contained no downhill section that a good runner could not take straight without braking, and the modern courses in which the good runner who scorned stick-riding broke his ski while inferior runners rode by on their sticks. As a result many good runners who were never stick-riders have been forced to specialize in stick-riding. " We believe," continues Oestbye, " that ski-ing in all its forms is our birthright, and that ski-ing must only be carried on in the form to which we are accustomed. We under-estimate the enormous development of ski-ing abroad. The truth is that we ought to possess such an interest in and such an understanding of all technical and administrative questions that we should no longer feel it necessary to greet with indignation suggestions from abroad. The slalom is no discovery that comes to us from abroad "—(the slalom as recently adopted at Oslo is a vastly different type of competition to the old-fashioned Norwegian slalom.—A. L.)—" we also used to hold such competitions partly in combination with the Holmenkollen races. No Norwegian

[1] In *Idrettsliv*. Translated by Luther, editor of *Der Winter*. Luther ascribes the tendency to choose steeper courses at Holmenkollen to the increasingly severe competition of the Swedes and Finns, who often beat the Norwegians on their own flatter courses, but who seldom succeed on the steep Holmenkollen courses. As the Norwegians in Finland and Sweden have to race under conditions which do not suit them, it is only fair that in Holmenkollen the courses should be set to give them every opportunity of profiting by their own specialised technique.

would shrug his shoulders in contempt over Nordheim's ' Meisterslalaam.' " (Nordheim is considered the founder of the Telemark ski sport.) " *We ought never to have abandoned the slalom,* for it is the best proof of all-round mastery of the ski, far more useful and far more legitimate than competitions in stick riding."

The dilemma of the langlauf does not trouble those who advocate downhill races, for in such races stick-riding is forbidden by the rules. We are not therefore forced to choose between easy slopes which can be taken straight without stick-riding and steep slopes which must be taken straight on the sticks. We can make good use of the steeper slopes which force the racer, who is not allowed to stick-ride, to demonstrate his mastery of the turns.

Herr Luther, who is a great authority on the history of ski-ing, further reminds us that Laurentius Urdahl, who was one of the first of the Norwegians to write about ski-ing, and who still edits an important Norwegian paper, wrote as follows in his ski-ing handbook (1893) : " Slalom competitions were often organized at the national competitions in Christiania. They were sometimes carried out on the jumping hills partly inserted into langlauf courses. Points were given for these competitions. It would in my opinion be a good plan if a slalom was included in the next Holmenkollen competition (1894). The hill is admirably adapted for such competitions." And he concludes by explaining that the course is marked out by little branches, the forerunners of the modern flags, and that the competitors are obliged to conclude with a telemark turn.

From which it would seem that in reviving and improving the slalom we should be praised by the

Norwegians for an act of piety calculated to propitiate the ancestral manes of our great sport.

Norwegians who ski in the Alps soon realize the limitations of Scandinavian technique. Captain Krefting, who has competed with distinction in many of the great Norwegian competitions, contributed to the 1930 issue of the *British Ski Year Book* some very interesting impressions of British ski-ing at Mürren. He arrived at Mürren quietly confident that a Norwegian had nothing to learn from English runners. " It was an alluring thought to come to Switzerland as a Norwegian and show these newcomers to our sport what ski-ing really was. . . . We laugh at the English ski-ing, and say that the English only take trains uphill and come down, that they spend the whole day climbing up and coming down the nursery slopes behind the hotels, and practise a lot of peculiar twists and turns, and we think they understand nothing at all of what ski-ing really is. This was how I also looked at things when I arrived out there in blissful ignorance." He then points out that the English use their nursery slopes for mastering the telemark, christiania, etc., " otherwise they have to lie down every moment, and to lie down is a thing that every skier tries to avoid." " The name ' downhill racing,' " he continues, " gives an average Norwegian a very faulty conception of what happens. This is natural as we conceive hills as hills and not as practically vertical drops. I stood on the different points where the races started and felt quite giddy looking down. To get down in our usual Norwegian way was quite out of the question—that would be tempting Providence too much."

He describes the Roberts of Kandahar Race, and adds : " This race was an imposing sight—to watch

these plucky young Englishmen coming down these steep hills with an incredible speed . . . it kindled in me an ambition to be able to master these hills as well as these men did. The polite smile was changed to one, first of surprise and then of admiration. I had long ago given up the idea of being able to impress by my Norwegian knowledge of ski-ing."

Nothing could be more sporting than Captain Krefting's frank admission that he, like most Norwegians, had formed an entirely incorrect impression of British ski-ing. British ski-ing owes whatever success it has achieved to two things, both of which are viewed with mild contempt by Norwegians, good teaching and downhill racing.

A Norwegian will tell you with simple pride that he really doesn't know the difference between a telemark and christiania. These fancy names don't interest him. " We Norwegians just turn. We skate round somehow. We don't know and we don't care which ski we weight or lift, and we don't enter into long discussions on such matters."

Skating round is easy enough on gentle Norwegian slopes, but all this pretence of " just turning " vanishes when you introduce a Norwegian to steep Alpine ground. The technique of ski-running on such ground can be taught, and even books—if a writer of books is not suspect on this point—have their value. I agree, of course, that ski-laufing cannot be taught. The steps can be picked up in a minute, but the rhythm and accurate timing, which is the mark of the expert ski-laufer, cannot be acquired from books, but only from long experience. Good teaching is, however, half the battle in ski-running.

The dramatic contrast between British ski-ing

before and after Mr. Caulfeild's book is an admirable instance of the value of teaching even in book form. Again the contrast between Alpine centres, where the teaching is first class, and those where the teaching is indifferent, is in itself a sufficient answer to the quaint theory that good tuition is useless in ski-running.

Oddly enough the Swedes, whose country is very similar to Norway from a ski-ing point of view, have realized and exploited the importance of good teaching.

At Storlien, in Sweden, I found a small colony of enthusiasts for the Alpine technique. The country round Storlien is not unlike the country round Finse. The same wide expanses of easy slope, but there is one mountain just near the hotel which provides about 700 feet of steep running on ground cut up by trees. At Finse it was the easy open slopes that were tracked ; at Storlien it was the steep, broken ground which was popular. Why ? Because, thanks to the enterprise of Count Hamilton, Mr. Nordenson and Captain Delane the Swedes have become enthusiastic converts to the importance of Alpine technique. Like the Norwegians the Swedes are born with ski on their feet, like the Norwegians the Swedes have a thousand years of ski-ing history to their credit ; like the Norwegians they are magnificent ski-laufers and also admirable ski-jumpers. And yet, they realize that they have still something to learn. The atmosphere at Storlien was infectious in its keenness. Walter Amstutz who was with me was dragged out and made to perform. I was asked to set a slalom and, having done so in the morning, I was amused to perceive a number of Swedes going off in the afternoon armed with flags. " See how

quickly the slalom poison spreads," remarked Count Hamilton.

The Swedes believe in teaching. They provide their school-teachers with a summary of the best methods of doing the various turns. The *Swedish Ski Year Book* contains translations of articles on technique by foreign writers. Colonel Bilgeri, the great Austrian expert, was invited to Sweden to give a course in ski-ing for the benefit of the Swedish Ski Association.

All this has a moral for American and Canadian readers. Their ski-ing ground is for the most part Scandinavian rather than Alpine in character. They should turn to their Norwegian teachers, of whom there are many in the States, for instruction in ski-laufing and ski-jumping in which the Norwegians excel, but they can imitate the Swedes by taking such opportunities as their country provides for developing ski-*running* technique. Indeed, when I think of the great initiative shown by men like Mr. Douglas of the Canadian Amateur Ski Association and Professor Proctor of America as far as the slalom is concerned, I am bound to acknowledge that the Americans and Canadians, like the Swedes, have been quick to appreciate the value of the slalom and of the importance of Alpine technique.

I should like to conclude by paying a very sincere tribute to Scandinavian hospitality. I came to Oslo as the *advocatus diaboli,* the champion of the despised slalom. I was not only made welcome officially, as a British delegate, but in a thousand ways I was made to feel at home. I shall never forget a night at the Fram Club where I was the guest of that most hospitable of all ski clubs. Nor shall I lightly forget the way my Norwegian friends took

me in hand and looked after me. It would, however, be a poor compliment to return that kindness by insincerity.

I do not suppose for a moment that this book will be read in Norway, but if by chance any Norwegian scans its pages, and should be incited thereby to start a campaign in Norway similar to the campaign waged by Count Hamilton in Sweden, my efforts will not have been in vain. My great ambition is to see Norwegians competing in downhill races against the best downhill runners in Central Europe and Great Britain. Ski-ing with the Norwegians is, what it will never be to the British, a matter of national prestige. The spirit of Holmenkollen is unique. It is the nearest approach in these degenerate days to the spirit of the Olympic Games at their best. I am convinced that once the Norwegians get down to the job of training for downhill races, they will beat the best runners of other countries, including, of course, the British who will always be hopelessly outnumbered decisively in downhill racing, langlauf and in jumping. The general average of ski-running in Central Europe will continue to be, as it is now, vastly higher than the general average of Norwegian ski-ing, for a country of steep slopes will always produce a larger number of good ski-runners than a country of gentle and undulating gradients. None the less, I am sure that if the Norwegians determine to send their picked men to train in the Alps, they will be very difficult to beat in downhill racing. It is vastly easier for a good ski-laufer to master ski-running than vice versa. The Alpine ski-runner will have to work very hard indeed to keep their championships in the Alps.

Finally, let me advise all British runners to visit Scandinavia. They can get good downhill ski-ing if they know where to look for it, even if Scandinavia has nothing to compare with Männlichen and Parsenn-Furka. And a few weeks in Scandinavia should convince even the most fanatic of ski-runners that there is a real charm in ski-laufing. No Englishman will ever acquire that easy rhythm which distinguishes the best Norwegian ski-laufers. But, at least, they will learn in Scandinavia the elements of an essential branch of ski-ing technique and acquire knowledge which will add greatly to the interest and variety of their Alpine tours. Alpine ski-ing is not solely a matter of running downhill.

CHAPTER II

EQUIPMENT

SKI

FEW words need be wasted on the problem of material. There is room for controversy on most aspects of ski-ing, but so far as the wood from which ski are made is concerned, there is almost universal agreement on the merits of hickory. Ash, it is true, is lighter than hickory and slightly more elastic, but these advantages are dearly bought. Ash wears out much more rapidly than hickory, and the deep grooves that soon appear on the running surfaces render accurate steering difficult.

Hickory, again, requires less attention, so far as waxing is concerned, than ash: it is far faster and smoother, and consequently far easier as far as turning is concerned.

Skis are sold in certain standard lengths. In Switzerland the standards are fixed in centimetres, in Norway in our measure of feet and inches.

A rough-and-ready way of estimating the required length of ski is to stretch your arm above your head and stand the ski upright. Ski, the point of which you can just reach with the tips of your fingers outstretched, will be on the long side. Ski, which reach to the wrists of the outstretched arm, will be on the short side.

The following table provides a more accurate guide to ski lengths, and indicates the length of ski for ski-runners of varying heights, on the assumption that a medium length ski is required for

Height of Ski-runner in feet.	Swiss standard lengths.	Norwegian standard lengths.
6 feet 3 inches	235 centimetres	7 feet 6 inches
6 „ 0 „	228 „	7 „ 3 „
5 „ 10 „	220 „	7 „ 0 „
5 „ 7 „	210 „	6 „ 9 „
5 „ 3 „	200 „	6 „ 6 „
5 „ 0 „	190 „	6 „ 3 „

skiers who specialize in long expeditions. The ski-runner who has passed the Second Class Test and mastered his turns, can use ski 10 centimetres longer than the length given in the above table. An expert who stands six foot high, for instance, can comfortably manage ski 235 centimetres in length. Your choice will also be affected by the type of country in which you propose to ski. Steep slopes are exceptional in Scandinavia, and consequently Scandinavian ski are normally longer than Alpine ski. Short ski facilitate turning and long ski facilitate straight running. Long ski are rather tiring on long and severe tours in the Alps, for every inch on to your ski slightly increases the effort of kick-turning, especially on steep slopes of hard snow. This is a factor of real importance on really long climbs.

BREADTH OF SKI

Breadth is an important factor in the choice of ski. Narrow ski are used in gentle, undulating country where tracks abound. Langlauf racing is track-racing, and consequently narrow ski are used

in the langlauf. Extra weight is a serious handicap to a man who has to race uphill or along the level, and, other things being equal, a narrow ski is lighter than a broad ski. The great disadvantage of narrow ski is the fact that they sink more deeply into soft snow than broad ski. Langlauf races are run for the most part along a course confined in narrow tracks which are often icy. These tracks are common in Scandinavia, especially in Nordmarken, near Oslo, for instance. Consequently, both for racing and for ski-ing of the ski-laufing rather than the ski-running type, narrow ski are best.

In soft snow narrow ski are uncomfortable. They sink in more deeply than broad ski and consequently are slower. They are difficult to turn on, for a broad ski, especially in the telemark turn, rides round on the banked-up snow, whereas narrow ski tend to cut into the snow and makes skidding round difficult, if not impossible.

In soft snow broad ski are definitely faster and easier to manage, not only for turning, but also so far as straight running is concerned. On the ascent, as I said, the extra weight is a disadvantage.

On hard snow, it is the universal experience of jumpers that broad ski are steadier when they land than narrow ski. The fact that broad jumping ski are more difficult so far as the final stop-swing is concerned does not worry the jumper, provided that they are steady on the straight descent after he alights from the jump. Jumping ski generally have three parallel grooves on their running surfaces which emphasises their steadiness in a longitudinal direction.

On certain short racing courses which call for very

little turning, jumping ski would probably pay when the snow is hard.

The best racers prefer broad ski, not only for soft snow, but also for hard snow courses. They are undoubtedly steadier so far as straight running is concerned. They are undoubtedly easier for turning in soft snow, but I doubt their advantages in turning on hard snow. On hard snow ski of average breadth are, I think, easier so far as turning is concerned. Very narrow ski are a nuisance on downhill turns on steep slopes. The boots tend to project on each side of the ski and so do the toe-irons. This does not matter for straight running—provided the ski are waisted, see below—but projecting toe-irons are apt to catch when traversing on steep slopes of hard snow.

Broad ski, on the other hand, are tiring on steep slopes, and the strain on the ankles is very severe during traverses. A long descent on steep slopes of frozen snow is extremely exhausting if you are wearing very broad ski. For this reason, broad ski are definitely a mistake on long tours and for serious ski-mountaineering.

The ultra-broad ski (Bracken model) are, to sum up, good for racing on hard and soft snow, very suitable for ski-running at funicular centres where practically all the climbing is done by rail, but unsuitable for long tours.

Narrow ski are definitely unsuitable in the Alps for all purposes excepting langlauf racing. Ski of average breadth will, therefore, be more suitable for general requirements.

The *weight* of the ski-runner should also be taken into consideration. A heavier man requires a more highly sprung ski, and also, other things

being equal, a larger bearing surface which can be obtained either by greater breadth or greater length.

The following useful table of weights and measures is reproduced from Messrs. Lillywhites' catalogue. I have substituted "langlauf" for "racing," since the measurements in the first column only apply to langlauf races.

The dimensions of the Caulfeild straight-edged ski, described below, are 8·6 from tip to heel.

THE WEIGHTS AND MEASURES OF SKI

BREADTH IN CENTIMETRES:

	Racing	Swiss Touring Narrow	Norwegian Touring Standard	Swiss Touring Standard	Norwegian Touring Broad	Bracken	Jumping
Tip	6·75	9	8·5	9·50	9·25	10·5	9·75
Centre	5·75	6·25	6·5	7	7	8·5	8
Heel	6·25	7	7·5	8·5	8	9·5	8·75

WEIGHT IN LBS.:

Hickory	7¼	8–10	8¼–9¼	9–10½	8½–10	9½–10	12–13
Ash	—	7½–8	—	7½–8½	—	—	—

SHAPE OF SKI

Ski are normally made, as will be seen from the above table, narrowest at the waist, of medium breadth at the heel and broadest at the upturn. In this, as in other matters, the Central European ski-runner has followed blindly the Scandinavian precedent. The Scandinavian ski is a narrow ski for reasons which have already been explained, and it is essential that narrow ski should be "waisted" for the following reasons. On narrow ski the boot and toe-irons project considerably on either side of the ski, and unless the ski were broader in front than behind, these projections would act as a brake and

slow up the skier. Moreover, there would be considerable danger of the skier pitching forward, because his projecting toe-irons or boots caught suddenly while he was travelling downhill. The broad upturn clears the track, with the result that the projections do not catch.

But though the "waisted" shape is essential for narrow langlauf ski, the advantage of this shape for broad ski is less obvious. Mr. Caulfeild, who has experimented with straight-edged ski, writes as follows (*B.S.Y.B.*, Vol. V, p. 187):

"Throughout last season I used a pair of skis that I had had made with straight, parallel edges instead of the usual narrow-waisted shape, the virtue of which I had begun to doubt. They proved to have the advantages I had hoped for.

"They were unusually steady and comfortable for traversing, especially on hard snow. In traversing on hard snow the straight edge gives a better grip than the curved one, and runs more cleanly. Also, it reduces ankle strain; for with the normal, waisted shape the leverage on the ankle in traversing depends on the width of the widest parts of the ski at the front and the heel-end, rather than on that of the narrow part under the foot. My skis, for instance, which are 8·5 cm. wide throughout, have about the same supporting area and floating power in soft snow as the same sized ski with a width of 9·5, 7·5 and 8·5 cm. at the front, middle and heel end, but are more comfortable for traversing than the latter.

"Another advantage of the straight edge is that the whole edge wears equally and comparatively slowly, while with the curved shape the edges of the widest

part at the front and heel end soon become badly worn by hard snow.

"I was prepared for unforeseen drawbacks in other respects, but could find none. In soft snow as well as on hard these skis were as steady and fast for straight running and as easy for turning as those of normal shape."

I tried out a pair of Mr. Caulfeild's straight-edged ski[1] last winter (1929–30) and found that they possessed all the advantages claimed for them. Last winter was rather snowless, and the comfort of parallel-edged ski on hard, icy steep slopes must be experienced to be believed. I did not find these ski more difficult for turning either in soft or on hard snow. They are, however, slower in soft snow, for there is no broad upturn to clear the track, and even on broad ski the toe-irons will project and act as a brake, a serious disadvantage in breakable crust.

There is one more point so far as the shape of the ski is concerned. The upturn should be very gradual. It should be difficult to say where the running surface ends and the upturn begins. Again, a first-class pair of ski is distinctly whippy. If you stamp on the ground, the upturn should quiver slightly.

STEEL EDGES

Steel edges were, I believe, invented by the Austrians. A thin strip of steel is fixed into the running surfaces along the edge line of the ski, one steel strip for each edge.

This steel edge projects very slightly and thus gives

[1] As supplied by Messrs. Fortnum and Mason, Piccadilly.

an admirable grip on hard snow or on ice. Steel edges undoubtedly give great comfort on icy slopes. They were used with great effect by the Austrian competitors in the Davos University Winter Games of 1930.

Steel edges should not be used by novices, since they call for great accuracy in turning. The inside ski in a stem-christiania must be flattened at exactly the right moment, for if it is held on its edge a second too long the steel will bite relentlessly into the crust and refuse to skid round. Shin-guards should be worn, for if the steel edge catches an unprotected shin, the result will be painful. Steel edges, in their present form, sometimes tear off if the ski strikes a rock. A steel edge partially removed would be a terrible nuisance. Steel edges, again, add to the expense. I doubt if they will be a commercial possibility at much less than 10 shillings a pair, including fitting.

In spite of these obvious drawbacks I believe that steel edges have come to stay.

BINDINGS

There are two main families of bindings, rigid bindings and spring bindings. By rigid bindings, I mean those bindings in which the toe-irons are rigidly attached to the ski. By spring bindings, I mean bindings in which the toe-irons are movable and the movements controlled by a spring.

Huitfeldt and Alpina are rigid bindings ; Schuster and Bilgeri are spring bindings.

I have had exceptional facilities for comparing the merits of rigid and spring bindings respectively. I skied for twenty years with a spring binding on

my right foot and a rigid binding on my left. Owing to a severe mountaineering accident, my right foot is short, and my toes are so stiff that I cannot kneel down if I use a rigid binding. A heavy fall in a rigid binding used to cause me the most intense pain. I am therefore most grateful to the inventors of spring bindings for making ski-ing a comfort instead of an agony to those who are handicapped with stiff toes. But even so, stiff toes are a great handicap, for there is no comparison in the comfort and the control of a rigid and a spring binding. The ski on my left foot, on which I wear a rigid binding, is practically part and parcel of my leg, whereas my right leg always appears to be loosely attached to a rather capricious ski.

Zdarsky invented the first spring binding, the Lilienfeld. Colonel Bilgeri produced a great improvement which is still widely used. The Bilgeri binding has, however, one serious defect. It is extremely difficult to repair on tour. I may have been unfortunate, for I broke five Bilgeri bindings in as many weeks, after which I decided, rightly or wrongly, that the Bilgeri, despite its good points, is no binding for a ski-mountaineer.

The Schuster binding is less comfortable than the Bilgeri, but is most reliable. I have never had any trouble with a Schuster.

Rigid bindings may be divided into those like the Huitfeldt in which the toe-irons are first of all passed through a hole in the ski before being hammered into shape, and those like the Alpina, Eriksen, Haug, etc., in which the toe-iron is fixed on to the upper surface of the ski. I believe that the latter are better because the toe-irons project less, and because a better fit seems to be possible than with the old

Huitfeldt type of toe-iron. I do not propose to discuss at length the merits and demerits of the Eriksen, Haug, Bergendahl and countless other bindings of this type. I have tried most of them, and they all have their good points. My own favourite binding is the Alpina B. This binding is easily adjustable to fit any shape of boot, and once adjusted gives no trouble. The Alpina B. is extremely easy to put on and to take off. A spare binding can be fixed on in a few seconds if the heel-strap breaks, though I have never known it break in my experience.

The Alpina toe-iron can be worn either with the heel-strap provided or the lapthong or the B.B.B., of which more anon, or with the Beetschen binding. With the B.B.B. and Beetschen bindings one can dispense with heel-straps. A permanent prong is attached to the boot which is secured with a clamp to the B.B.B. or Beetschen attachment which is permanently fixed in front of the toe-irons. The clamp is then fastened by a spring.

The B.B.B. and Beetschen are supposed to be more dangerous than other bindings. I am not convinced that this is the case, but I admit that it is by no means easy to free oneself from these bindings after a bad fall.

The B.B.B. may be worn with any type of toe-iron, Huitfeldt, Alpina, etc.

For slalom races I cordially recommend a combination of B.B.B. or Beetschen and any other binding, preferably the Alpina binding. This is a form of insurance. More than one race has been lost because a heel-strap broke or suddenly came undone, but if you are wearing a B.B.B. with another binding you can carry on to the end of the race if one or other gives way.

There is one point of some importance in connection with bindings. A spring binding is, as we have seen, essential for a man with very stiff toes. But even moderately stiff toes may prove a great handicap if you use a heel-strap which passes through the mortice underneath the toes. The old type of Huitfeldt or lapthongs, which are drawn through the hole underneath the toe-irons, can only be used with comfort if the skier has reasonably loose toes. When the foot comes forward the tension on the heel-strap increases very rapidly, and a man with moderately stiff toes finds it painful to kneel. The Alpina B. binding is fixed to the toe-irons, which in turn are fixed on to the top surface of the ski, and consequently there is no increase in tension when the foot comes forward and no discomfort from stiff toes.

THE POSITION OF THE TOE-IRONS

The correct position for the toe-irons is discussed at length by Mr. Bernays, Mr. Musard Nanson and Mr. Caulfeild in the 1928 and 1929 issues of the *British Ski Year Yook.*

Mr. Caulfeild argues that the toe-irons should be set so that the waist of the boot is exactly over the centre of the *bearing surface* of the ski, not, be it noted, the centre of the complete ski, including the upturn, but the centre of that portion of the ski which alone is in contact with the hard snow surface when the ski is resting on the snow. This means, to quote Mr. Caulfeild, " that the toe-iron and mortice were about 15 cm. (for a big foot) ahead of the centre of the ski's length, barring the upturn. The central position of the foot, which theoretically gives maximum floating power and ease of pivoting in

soft snow, with neutral balance in side-slipping, proves in practice to be much better for these reasons than the normal backward position. It prevents the annoying tendency, due to overweighting of the tail end, for the ski to turn upwards automatically if it slips in traversing, and to skid round too sharply and too far at the end of a turn." Again, " according as the foot recedes either backwards or forwards from this central position, either downhill or uphill turning respectively must become increasingly difficult."

THE AMSTUTZ SPRINGS

The Amstutz springs were invented by two famous Swiss ski-runners, Dr. Walter Amstutz and Dr. Guido Reuge, and consist of springs clipped on to the ski at the back and attached to the skier's ankle by means of a strap. The advantage of these springs is that they facilitate control, preventing the heels rising too easily from the ski. Certainly these springs are useful in the jump-turn, and invaluable to those who use spring bindings, as the great defect of spring bindings is that the foot comes forward much too readily.

Many skiers also find these springs very helpful while climbing.

STICKS

Ski sticks are made either of bamboo (male bamboo alone should be used), aluminium or hazel. Hazel sticks are solid and much less easily broken than bamboo, but they are heavy, and the modern skier does not like heavy sticks. Aluminium sticks, the so-called Caulfeild sticks, are nearly as light as bamboo and more durable. Even the best bamboo

has an annoying habit of splitting. The one great disadvantage of these aluminium sticks is that they are colder to the touch. They are fitted with an excellent rubber grip, and as long as one's fingers do not leave this grip, all is well, but mine have a habit of straying from the rubber grip down the aluminium shaft, especially on traverses. I never wear gloves unless obliged to, and I have found these aluminium sticks distinctly cold with gloveless fingers.

The height of the sticks should be such that when the stick is stuck into the snow upright the top of the handle reaches the armpit.

Sticks should be provided with a broad leather handle strap which is a valuable support to the hand when climbing or ski-ing along the level. Handle straps should be thick and not like the bootlaces I have sometimes seen. These cut into the hand and are worse than useless.

Sticks should be both light and strong. No ski-runner who has known the comfort of light sticks would ever willingly revert to heavy sticks. Unfortunately no light stick can be absolutely guaranteed not to break, and consequently I never dare to take bamboo or cane sticks for an expedition in the High Alps, but return reluctantly to the hazel sticks which I should never dream of using on a small tour.

Good sticks are made of male bamboo, but the most satisfactory of the lighter sticks are made of Tonkin cane, which comes from China and Japan. On the whole the Chinese variety of Tonkin cane appears to give most satisfaction. The Amstutz sticks are made of Tonkin cane.

FIELD JUMPING

E. W. RICHARDSON, W. J. AND P. RIDDELL

(NOTE THE EFFECT OF THE AMSTUTZ SPRINGS, p. 31)

BOOTS

I am no authority on boots, and shall not attempt to provide the reader with a specification for a perfect boot. I refer him to the excellent article in the *British Ski Year Book*, Vol. II, p. 141.

Do not go to a bootmaker about whom you know very little and try to explain what you want, but go to an acknowledged expert on ski boots and leave everything to him.

It is of vital importance to get good ski boots. First-class ski-ing boots are not cheap, and therefore rule out as useless any boots which are offered far below the usual market price. Badly fitting boots make all the difference between ease and difficulty on touring. Nothing is more maddening than a boot that begins to buckle, as plenty of new boots have done, directly the heel-strap is drawn tight. Frost-bite, again, is common with bad boots which let in the water. Don't economise in boots. Pay good money, and buy your boots from a specialist in ski-ing footwear.

SEALSKINS

There are two main types of sealskins, those which are fastened on by buckles, and Sohm skins, which are stuck on with wax. Sohm skins save at least 20 per cent on time and trouble on a long climb. With tie-on skins the snow has an irritating habit of getting wedged in between the ski and the skin. The only disadvantage of Sohm skins is the fact that they are rather difficult to put on out of doors, and sometimes come unstuck in the course of a long climb. On big mountaineering expeditions I have

always carried two pairs of skins, Sohm, which I far prefer, and the ordinary buckle-on type in case the Sohms give trouble. It is important to realise that it is not only the ski but also the skin which needs waxing.

Lord Lytton has, however, invented a simple device which may render this precaution unnecessary. Just behind his binding on the top surface of the ski he puts a buckle and attaches to the heel-end of the Sohm skins a long strap which is passed up from under the running surface to the top surface of the ski and drawn tight through the above-mentioned buckle. Lord Lytton assures me that he has never had the least trouble with Sohms since he invented this device.

KANDAHAR EMERGENCY OUTFIT

The Kandahar Emergency Outfit is sold by Messrs. Lillywhite, Ltd., and includes bandages, boric lint, medicated wool, surgical scissors, forceps, plaster, boric ointment, aspirin, iodine and sal volatile in roll-up case. Also one pair of ski clamps. The case contains, in other words, the indispensable requirements for an emergency outfit of this description. The medical items are based on a list supplied by a leading surgeon who is also a ski-ing Gold Medallist.

THE LILLYWHITE CLAMPS

This clamp takes the place of a broken ski point, and is by far the best clamp on the market. They can be put on in half a minute and are extremely comfortable to run on. They have been on the market for some years and have stood the test of time.

CREPE RUBBER SOLES

I have used these on my boots for years. On most snow surfaces they give an admirable grip, and the snow does not ball on the crêpe rubber to anything like the same extent as it balls under ordinary boots. Good crêpe rubber is expensive, and unless very skilfully fitted has a tendency to buckle.

CLOTHING

Ski suits should be made of waterproof and windproof material and should be absolutely smooth. The slightest suspicion of a " burr " in the material will collect powder snow which will adhere in large lumps. The Trefoil suit made by Messrs. Pope and Bradley is very serviceable and smart, but it is not particularly cheap. I should be perfectly content with a suit that kept out the wind and water, if I wore clothes to please myself, but, alas! others have to be considered.

The Trefoil suit is not intended for serious mountaineering or ski-ing in Scandinavia where there is usually a wind, and where it must be reinforced by a wind-jacket. There are excellent jackets to pull on over the head which are to be found in Norway and Sweden, and which would be equally useful in the Alps.

For Gloves see page 156. The Lexden Ski Socks, which can be purchased at the leading sports shops, are excellent and are British made.

ODDS AND ENDS

I use Triplex glasses manufactured by Messrs. C. Davis Keller, and have found them very satisfactory.

It is a great mistake not to wear coloured glasses, excepting possibly in mid-winter. Triplex glasses, which can be made up in any colour or form, are particularly effective in keeping out the dangerous rays.

The Bergans rücksack, as used by the Norwegian Army, is far and away the best model for skiers.

An aneroid is always an interesting companion on a climb, and extremely valuable in a mist.

The art of waxing really requires a chapter to itself, but as this book is primarily for ski-runners rather than for ski-laufers, I will spare the reader that chapter. The ski-laufer has to solve a particularly troublesome problem. He has to find a wax which will prevent his ski slipping backwards on the ascent and which will help his ski to slip forward on the descent. Every type of snow has its own appropriate type of wax. A langlauf race is often won by a correct meteorological forecast.

The ski-runner's problem is much simpler as he can use his sealskins for the ascent, and only requires a type of wax which will help his ski to slide on the descent.

It is well worth observing that slow ski are a nuisance once you start turning. In the old days many a veteran runner liked to keep his ski slow, because this enabled him to take slopes steeper than would be possible on fast ski. In steep country the man who takes slopes straight on slow ski usually gets to the bottom more rapidly than the man on fast ski, who is bound to turn. Unfortunately, this advantage of slow ski is dearly bought as slow ski do not skid round very readily. A man wearing a well-waxed pair of hickory ski will turn much more easily than a man wearing a slow pair of ash ski.

The Norwegians do not wear sealskins, partly because their slopes are gentler, and partly because they are extremely skilful in the use of waxes. Dr. Walter Amstutz, who has done as much ski-mountaineering as most men, says that he has only used sealskins once in his life, and relies entirely on wax, so that apparently even on steep Alpine ground sealskins are not quite as essential as Englishmen seem to imagine.

Lillywhites issue a very useful pamphlet on ski wax.

CHAPTER III

FUNDAMENTALS

FIRST-CLASS ski-running depends partly on attention to detail, but mainly on assimilating fundamental principles. The correct amount of ski-edging to insure smooth turning, the precise point in which the weight should be thrown from one ski to another, are problems of detail, and as such are, of course, important. But I am not concerned in this chapter with such problems of detail, but rather with the general principles that apply to almost all ski-ing manœuvres.

It is vital to realize at the outset that ski-ing is a matter, not only of the feet, but also of the hands and knees.

Let us begin by considering the knees, which play a far more important rôle in ski-ing than most novices realize.

Watch a first-class ski-runner diving down an irregular slope. His body responds to every rise and dip in the ground. His knees are elastic; they bend as he strikes a bump and straighten as he strikes a hollow. His knees may be compared to the springs, his body to the chassis of a car.

But nothing is more difficult than to keep your knees relaxed when you are ski-ing. Just as your first reaction in the dentist's chair is to stiffen your

jaw out of sheer fright, so your first reaction to speed is to stiffen your whole body from the ankles upwards. As your pace increases you try to remember the advice reiterated in the books: "get your weight forward and keep low." And instead of lowering your centre of gravity by bending your knees, you bend forward from your waist with your legs almost straight—a most insecure position.

It is difficult to crouch if you are frightened, and the more you are frightened the more your knees will tend to stiffen. Pious resolutions are of no avail. Force your knees to bend. Murmur to yourself, "Looser, looser," the moment you begin to feel frightened. Pray for looseness, struggle against stiffness.

Take advantage of gentle slopes to get the springy feeling into your knees by alternately straightening and bending your knees.

HAND CONTROL

The position of the hands is a matter of great importance. The hands should never be allowed to drag. They should always be well ahead of the body. The position of the hands is an index of the ski-runner's will to stand. If his hands are well forward, you may be sure that he firmly intends to hold on until he is thrown. He may be *thrown*, but so long as his hands are forward he will not *lie down*. But when you see his hands begin to creep backwards you can bet with confidence on a fall. His courage is beginning to fail. Subconsciously he is preparing for the base compromise of a *sitzmark*, an expression which I shall use throughout this book to indicate the intentional fall, the "lie down,"

as opposed to the more honourable fall in which you are definitely thrown.

A valuable tip, not only for novices but also for advanced runners, is to keep the hands actually in contact if there is the least danger of falling. This method will be described in a later chapter.

A first-class runner's hands are not only well forward, but they are always steady. The hands come round easily and rhythmically as he turns. He does not wave them about wildly in the air. The steadiness of his hands is evidence of the steadiness of his balance. His body is under control because his hands are under control.

Don't knit. Don't wave your hands about as if you were knitting a jumper. Don't paw the air with your arms. *Don't pluck.* If you are traversing a steep slope, don't stretch out the top hand to touch the slope as if you wanted to pluck a flower on your way. Keep your hands steady. As the pace increases think of your hands. The mere effort of bringing them forward and keeping them low will steady you. If your hands are fussy, your body will be fussy. The mere effort of controlling your hands is in itself a tonic for your nerves.

SKI-ING IS BELIEVING

Falls are due to lack of will-power. There is an element of volition in ninety-nine falls out of a hundred.

Never lie down until you are thrown. The man who is determined never to fall until the ground gets up and hits him between the eyes will soon make a skier.

Of course, there are rare occasions on which an

intentional fall is justified, e.g. if you are heading for a cliff or an open crevasse or a judge of a ski test which you are hoping to pass.

Most falls, however, ought to be and can be avoided. A bad runner always assumes that he is under a positive obligation to fall if anything unusual occurs. If one ski parks itself in an icy rut, the bad skier promptly sits down. He does not even wait to fall. Etiquette, he seems to think, demands a prompt surrender.

The bad runner does not realize that even a forward fall is frequently a sign of pure funk. If he pitches *forward,* on striking a sudden patch of soft snow, he feels virtuous, he assumes that there can be nothing intentional about a forward fall. He is wrong, for the will to stand would probably have saved him. The really determined runner instinctively braces himself the moment his leading ski strikes any unforeseen resistance. He braces himself, because he has the will to stand, and his leading ski drives through the resistance. The bad runner, instead of bracing himself, goes flabby, and his muscles and his will surrender to the unforeseen check, and over he goes.

It is amazing what one can survive in the way of changes of gradient or of snow if one is feeling really good. Even when you believe that a fall is inevitable, try to stagger on for a yard or two. " I'm going to fall, of course, but I'm jolly well going to wait until I'm thrown down. I don't mind falling, but I do object to lying down." If this be your attitude you will get away with it time and again. Your ski gets into a rut. Set your teeth and drag it out of the rut. You strike a bump and fly into the air. A bad runner, of course, will at once assume

that he has a legal right to lie down once his ski leaves the ground. If a man who jumped seventy metres stood, surely you can manage an impromptu five metres without collapsing.

It is not a law of nature that a man must lie down because his ski gets caught in a rut, because he strikes breakable crust or because the gradient suddenly changes.

Dick Waghorn told me that he once saw Mackintosh running at high speed down a very steep slope. His back ski caught suddenly and buried itself in the crust. He lurched forward, recovered, dragged his ski out of the crust, waved it behind him and ran down for nearly thirty yards (the slope was about 25 degrees steep) with the back ski balanced in the air like the unemployed foot of a Continental skater. He swung it forward by a terrific effort just as he was on the point of falling, replaced it on the snow and reached the level outrun in safety.

Mackintosh has an unusually fine balance. But even the poorest of runners can improve his ski-ing by cultivating the will to stand. Don't give up. The one ski-ing crime is to despair. Fight against a fall to the very last. There is a line from Euripides which should be engraved on every pair of skis. "ἄελπτον οὐδεν πάντα δ'ελπὶξειν χρεών." "Nothing is hopeless, we should hope for everything."

TOE-SPIN

Toe-spin is the commonest of all ski-ing crimes. It is the result of allowing the inside foot on a traverse, or the inside foot at the end of a christiania turn, to lag behind.

Taking all the weight off a ski helps the ski to

TOE SPIN AND "SPLITS"

CORRECT POSITION FOR TRAVERSING

spin round. Conversely, if you don't want the ski to spin round, you must not unweight it.

On a traverse or at the end of a christiania turn the weight should be evenly distributed on both ski, and both heels should be firmly on the ski. If the inside ski lags, the weight falls on to the other ski and you are, in effect, balancing on the heel of the leading foot and the toe of the back foot. And the result, very often, is toe-spin. The back ski spins round, producing a " splits."

Toe-spin in the telemark position can only be avoided by holding the ski rigidly together, and thus forcing the leading ski to assist in controlling the back ski.

Apart from the telemark turn and telemark position, there is no exception to the rule that the inside ski in a turn and the top ski on a traverse must lead, and that a lagging upper ski or lagging inside ski is the prelude to toe-spin. *Keep the inside ski ahead.*

HOW TO IMPROVE

In one of my gloomier moments I suggested that nobody really enjoys ski-ing, since the skier is always either ski-ing too fast and frightened, or too slow and ashamed. This is, of course, not quite true. Few things are pleasanter than a long day among the hills when one is ski-ing comfortably within one's powers, taking no slope straight that frightens one, and doing all one's turns just five per cent within one's speed limit. Great fun! As far as pure pleasure is concerned one should choose ski-ing companions just ten per cent slower than oneself. Just slow enough to give you a pleasant sense of superiority, and not slow enough to keep you waiting.

But if you want to improve, you must give up ski-ing for pleasure and yours will be the joy of having done rather than the joy in doing. It is pleasant to stand down a slope of powder snow well within your powers. It is highly unpleasant to take Lone Tree Slope straight. But a man who has taken Lone Tree straight and has stood, experiences the joy of *having* done, which is far more intense than the joy in doing. Body and mind go out in a glorious reaction of safety following danger, of repose following strain.

To improve, you must seek out better runners than yourself and hunt them down the slopes. Select a companion about 15 per cent faster than you are. It is useless for a third-class runner to ski with first-class runners, but to chase a man who is definitely but not hopelessly better than yourself down a long run, to vow that you will keep him in sight, is a great education. You will derive a keen thrill from those moments when you are actually sitting on his tail, and an even keener thrill when you succeed at rare intervals in overtaking and passing him. In other words, to improve at ski-ing you must race. Unofficial races are better than nothing, but an official race, especially with runners of your own class is, of course, the best of ski-ing schools.

DON'T BE IMPATIENT

Half the trouble in ski-ing turns is impatience. In almost every turn the skis resist the turning movement. To hold the position is always a certain strain. The skis resist this strain by attempting to run parallel again.

The beginner is apt to give in to this resistance.

Instead of holding the position of the ski rigidly in the case of a steered turn, and instead of transferring his weight boldly to the outside ski by means of a swing, he attempts to force the turn and anticipate it by leaning inwards. This is always fatal in a steered turn.

Hold on to the correct position and your skis will soon realize that you are their master. After a momentary hesitation they will give up the unequal struggle and begin to do their duty.

PRACTICE

The skier is faced at the outset by one great difficulty inherent in the nature of the sport. It takes anything from ten to twenty times longer to climb a slope than to run down it. Consequently, your opportunities of practice are sadly limited. A man who is staying at a non-funicular centre will be lucky if he averages 3500 feet of downhill running a day.

The man who wishes to improve should never waste height. There are two methods of practising stop-turns. You can acquire the requisite speed by running some considerable distance down a gradual slope, or you can climb up to a steep little bank, take it straight and turn as near the bottom of the bank as possible. You can work in far more turns per hour of practice if you adopt the latter method.

Don't waste easy slopes. The gradual slope which can be taken straight with your eyes shut should be exploited by the conscientious skier. He can improve the elasticity of his body by bending and straightening his knees. If the surface is slightly irregular, he can practise "field-jumping."

In this connection, I should like to remark that though there is nothing about field-jumping in this book, the omission is due to lack of personal experience[1] on the part of the writer rather than the conviction that the Geländesprung serves no particular useful purpose. It is true that a man can become a first-class runner without ever mastering the Geländesprung, but none the less field-jumping develops elasticity, "nippiness" and a general feeling of being at home on ski. My friend, Mr. Bedford Russell, who gave a trophy awarded annually on a field-jumping competition, rendered a valuable service to British ski-ing by calling attention to this rather neglected branch of the sport. There is an excellent chapter in Mr. d'Egville's *Modern Ski-ing* on the Geländesprung which I recommend the reader to study.

[1] Field-jumping was not invented in the days of my youth. In my middle age I have a base liking for maintaining contact with the slope.

CHAPTER IV

THE "FORWARD KNEE"

THE knee plays such an important rôle in ski-ing that it deserves a chapter to itself. Long before I had visited the Arlberg or heard of Herr Schneider's famous slogan: "Chin, knees and toe in the same straight line," I had preached the importance of the "telemark knee." I coined this term because I associated the "telemark knee" with the telemark position for straight running, but the "telemark knee" is equally important in the stem and stem christiania. As, however, the "telemark knee" is equally important in the stem in the christiania and in straight running, I propose to adopt a less questionable term and to describe it simply as the "forward knee."

If you bend your knee just far enough forward to hide your toes, your knee will be in "forward knee" position. When your body is erect from the waist upwards, your chin, knee and toes will be in the same straight line.

In an earlier book I suggested that the reader should test the value of the telemark knee, as I then called it, by a simple experiment which can be carried out without putting ski on one's feet. If you bend forward your right knee and then—keeping most of your weight on the right foot—try to screw the heel round and outwards, you will experience no

difficulty. Now poke forward the right leg until it is quite straight, put your weight on to it and again try to screw the heel round to the right. You will notice that this movement is appreciably more difficult with a straight leg than with the "forward knee." The "forward knee" helps you to pivot easily on the ball of the foot. It makes for easy turning when you want to turn, and when you want to run straight it ensures getting your weight forward.

On visiting the Arlberg, I was very interested to discover the importance that Schneider attaches to the "forward knee." A friend of mine, Mr. Bedford Russell, who is himself a first-class runner and who has recently visited the Arlberg, writes as follows :

THE FORWARD SPIRIT

"As I see it, the point of technique in which Schneider's teaching is really ahead of ours is the means by which he achieves that the weight shall be forward. We all know that we should lean forward. But the average English runner so often tries to gain this end by courageously getting his head forward while his chassis projects backwards, the weight finally being anywhere but on the ball of the foot, where it should be. Schneider emphasizes the attention that should be paid to the angle formed by the shin and the ski, which at no time should be as great as ninety degrees. Bending of the knees, it will be seen, follows automatically. The heels never leave the ski under any circumstances.

"When sizing up a runner, the Arlbergers seem to lay great stress upon this angle. 'Amstutz? Yes, a very good runner. But Luggi's knees are a bit further forward over his toes.' Bracken's knees, I

NEUNER IN THE ARLBERG-KANDAHAR

G. REUGE RACING AT WENGEN

THE FORWARD KNEE

may say, are approved of. I have noticed that the same angle obtains in the case of good runners who employ the telemark position. Mackintosh (whose position for straight running, by the way, is very much the same as that of Dahinden) has his knee well forward over the toe, with his chest further forward still. Perhaps the time will come when the qualifying tests will be determined not by the angle of the slope, but by the angle that the shin makes with the ski! We will talk about a 45-degree man, or stigmatise a wretched beginner as a mere 90-degree chap.

"And if your chin, knee and toe are in one straight line, as they teach, you are certainly in a very fine position. And this rule ensures that the steeper the slope, the further forward you lean. I think that a perfect exposition of this stance is what has enabled the Master to evolve his well-known little pocket-christis which permit him to retain complete control while going down the steepest slopes. The weight is so much upon the toes, that the heels can be flicked lightly from side to side with the minimum of effort.

"I had had my first real appreciation of the virtues of the Arlberg style one day when we were showing Benno Leubner, the well-known Innsbruck runner, over the Allmendhubel in February 1929. Quorum Glade was at its worst,—very much cut up, and at a stage of rattling semi-breakable crust, covered with a thin layer of light powder. He pointed his skis practically straight down the slope, in the position of a moderate stem and with the knees much bent; and then, in complete control, proceeded comfortably down to the bottom in a series of rapid little pocket-christis."

The Arlberg emphasis on the forward knee is extremely sound, but the Arlberg tenet—" the heel should never leave the ski under any circumstances " —is open to criticism.

It is difficult to reconcile this tenet with two illustrations which appeared in a book of which Hannes Schneider and Stefan von Devan are the joint authors (*Der Moderne Schisport*). On page 197 of this work there are two illustrations of straight running, the first of which represents " mässig tiefe Hocke " (moderately deep crouch), and the second of which represents a runner in " denkbar tiefsten Hocke " (extreme crouch).

In effect the first illustration shows a runner in an inferior variety of the telemark position. In both illustrations the heel is right off the ski. Moreover, Fanck's book (p. 84) shows Schneider running in a semi-crouch position with the back heel raised.

Herr Schneider, I think, lifts his heel more often than he believes. It is, for instance, virtually impossible to execute Herr Schneider's " pocket-christis," as Mr. Russell calls them, or " tail-wagging," as this manœuvre is sometimes called, excepting by such an exaggerated emphasis of the forward knee position, that the heel is no longer in contact with the ski.

Pivoting round is much easier if the weight is on the ball rather than the heels of the ski, and " pocket-christianias " in heavy snow are almost impossible unless the knee is so far forward that no weight rests on the heel.

For the Arlberg tenet I should prefer to substitute the following tenet.

The weight should normally be on the ball of the foot. And indeed the forward knee position ensures that

THE FORWARD KNEE

THE RUNNER HAS RELAXED THE "FORWARD KNEE," HIS WEIGHT IS COMING BACK AND HIS TOP SKI IS LOSING CONTACT WITH THE SNOW

the weight is on the ball of the foot, which is the chief reason for this position. Getting the weight forward on to the ball of the foot minimises the risk of a backward fall, for the first phase in a backward fall is the transference of weight from the ball of the foot to the heel. Turning is rendered easier, for it is much easier to skid round a ski if you are pivoting on the ball of the foot than the heel.

It is, of course, quite unnecessary consciously to bother about lifting the heel. Indeed, any definite attempt to raise the heel would be a mistake.

CHAPTER V

THE GENERAL PRINCIPLES OF STRAIGHT RUNNING

"Keep 'em pointed downhill."—*Kandahar Motto.*

THE ideal ski track is a straight line. The nature of the ground or human frailty may render this ideal unattainable, and consequently every skier must master the turns, but the chief glory of our sport is in the dive downhill.

You will never become a first-class runner unless you devote a great deal of time and trouble to straight running. It is, of course, useless to hurl yourself down a slope on which you have no real intention of standing to the bottom, but I do not agree with Mr. Caulfeild that a skier should never take a slope straight unless he has an even chance of standing. The young skier should make a habit of taking a slope straight if he has a one-in-three chance of success. The middle-aged skier may be excused if he insists on an odds-on chance before he runs straight, but his ski-ing will begin to deteriorate from the day when he first decides never again to risk a heavy fall.

Do not deceive yourself. Your ski-ing will improve or deteriorate. It will not remain stationary.

A few years ago my ski-ing was beginning to deteriorate. I devoted a week to the stunt straight runs at Mürren, and at the end of that week I was running better than I have ever done before or since.

CROUCH VARIATIONS, ARLBERG-KANDAHAR, 1930

1. MACKINTOSH (DEDDINGTON) 2. BRACKEN (DEDDINGTON) 3. EMIL WALCH (ARLBERG CROUCH) 4. GUSTAV LANTSCHNER (EXTREME CROUCH)

In the following winter I was warned that dreadful things would happen to my game leg if I took a heavy toss. I was timid enough to be influenced by this gloomy advice, with the result that my ski-ing has become rather steadier, but quite definitely slower. I have given up all hopes of improving and have taken to ski-ing for pleasure. And every year my speed will become a little slower.

Let this be a warning to ambitious youth. No-fall running is an ideal for middle age. Aim at speed, and steadiness will come of itself. Your no-fall speed will always bear a definite relation to your maximum racing speed ; increase the latter and the former will automatically improve.

Of course, there is nothing praiseworthy about hurling yourself over Lone Tree Slope, and lying down long before you reach the middle. Such an exhibition merely proves that you have overrated both your skill and your nerve. But if you determine not to lie down until you are thrown, and if on the last outrun you fail, after a desperate effort, to maintain your balance, you have no reason to feel ashamed of yourself and you have every reason to hope for success at your next attempt.

Before discussing the various straight-running positions in detail, I propose to sum up the pros and cons of various recipes for steady straight running.

PROS AND CONS OF CROUCHING

Crouching has the following advantages :

1. The centre of gravity is lower, which makes for stability.

2. Wind resistance is reduced. Crouching increases one's speed.

3. " Perhaps the most important advantage of the crouch is a very great increase in the length of the lever from which any hip motion is transmitted to the ski." Thus writes Mr. Bernays, the great apostle of Arlberg methods. " I take off my hat to Bernays," writes Caulfeild, " and kick myself. I understood this advantage, but could not see how to express it clearly."

But surely the advantage of the crouch position *at the moment the turn starts* has no bearing on the advantage of straight running in the crouch position.

The " great increase in the length of the lever " is exploited to the utmost advantage, not by the ski-runner who runs in extreme crouch, and attempts a turn from that position, but by the ski-runner who rises in order to unweight his ski and then *sinks* into crouch position.

Everybody would admit that it is an advantage to *sink* into crouch position during the second stage of a swing proper (see p. 76), but this is no argument in favour of *running* in a crouch position.

The advantages of the erect position are as follows :

1. An erect position is far less tiring than the crouch. To tire yourself unnecessarily is foolish.

2. The lower you crouch the less " give " there is in your legs. A skier in the erect position, provided his knees are loose and elastic, can take up pressure by sinking into a crouch, a very different matter from running in a crouch position.

3. The more upright you are the greater your field of vision. This point is of some importance. In the crouch position the field of vision is limited in

two ways. In the first place your eyes are nearer the ground, and in the second place most people have a tendency to bend their heads forward when they are crouching. Contrast, for instance, the photographs of Schneider and of Mackintosh facing page 56. Mackintosh's head is pointing upwards, and Schneider's eyes are focussing on a point just ahead of his ski.

A wide field of vision is particularly helpful in a race. If you are overtaking another competitor, it is very important not to find yourself on top of him without warning, and again it is much easier to pick out a good line if your field of vision is not restricted to the few yards in front of your toes.

4. If you cross icy tracks, the lower your crouch the harder you will find it to rescue a ski which is caught in a track. It is comparatively easy to pick a ski out of a track if you are *not* crouching.

The value and the limitations of the crouch can nowhere be better studied than on the jumping hill.

A jumper on alighting has to resist vertical pressure, and also pressure in a fore-and-aft direction.

The technique for overcoming this double pressure is admirably described in *Der Moderne Schisport*, by Hannes Schneider and Stefan von Devan.

In the first place it is a great mistake to *land* from the jump in telemark position or in any form of crouch. The jumper lands in an upright position and only falls into telemark position when his skis touch the ground. In other words, he takes up the shock by lowering his centre of gravity.

He falls into the despised telemark position to counter the fore-and-aft pressure no less than the

vertical pressure. "If neither foot is advanced," writes Mr. Bernays, "the runner can stand more pressure, as the pressure is borne by both feet." If this were true, why does the jumper who has to overcome exceptionally severe pressure fall into telemark position? Again, what becomes of the Arlberg tenet "never take your heels off the ski"?

The good jumper, of course, recovers his normal position as soon as possible. "Avoid falling into a deep crouch," writes Schneider-Devan, "for the deeper your crouch the more difficult will be the recovery."

The good jumper falls into telemark position and then immediately straightens up again in order to take up the pressure at the point where the hill meets the level ground by again advancing one foot and again falling into a semi-telemark position.

The jumping regulations insist that a jumper should be penalized in style marks if he fails to recover his upright position after falling into telemark position.

I have never been able to understand why experts, like Herr Schneider, should assume that the technique for overcoming pressure on a jumping hill must differ radically from the technique of overcoming pressure in cross-country ski-ing.

Why is it a crime for the heels to leave the skis on tour, and essential for the back heel to leave the skis in alighting from a jump? Why is the telemark position ideal for absorbing the heavy pressure of a jumping hill, but ridiculous for absorbing pressure on tour? Why is it easier to resist pressure with the feet close together on tour, and yet easier to resist pressure by advancing one foot on the jumping hill? Why is it right to *run* in a crouch position on tour, and yet essential for the jumper to straighten

H. SCHNEIDER

STRAIGHT RUNNING POSITIONS

C. E. MACKINTOSH

out as soon as possible in order to take up pressure again by *falling* into a low position on striking the level ?

Mr. Bernays points out that Herr Schneider "does not insist that *advanced* runners should maintain the crouch throughout. When the slopes and snow conditions are uniform and easy, the runner may rise to a more or less erect position, if he chooses." But why should the advantages of the erect position be reserved only for "advanced runners" ? And in point of fact one hardly ever sees an Arlberg ski-runner in anything but a pronounced crouch. I remember one day when I was out with Herr Schneider taking a slope straight in an upright position. The slope was not particularly steep ; the snow was easy and the outrun gradual. There was not the least risk of a fall. Why crouch under these circumstances ? None the less Herr Schneider criticized my position as "much too upright."

PROS AND CONS OF THE NARROW TRACK

The narrow track has the following advantage.

Two skis which are kept in contact are the equivalent of one ski in many respects so far as control is concerned. If your skis are apart, both of them will require individual attention to keep them parallel.

Again, the closer the skis are together the easier it is to advance one ski, if the fore-and-aft resistance has to be countered. Skiers who make a habit of running in a broad track find it particularly difficult to lengthen their base when striking resisting snow.

The disadvantage of the narrow track is that lateral stability is, of course, less easy to maintain

in this than in the broad track position together. This matters very little for straight running, provided you are running straight down the fall of the slope. On a traverse, however, the single spoor is definitely unsound even in soft snow, and is, of course, particularly unsound on hard snow, for on a traverse lateral stability is more of a problem than longitudinal stability.

Herr Schneider runs with the skis very near to each other if not actually touching, and the best Arlberg runners ski with their skis about six inches apart. Mr. Bracken believes in the single spoor. Herr Schneider himself would start proceedings for slander if he could see some of the caricatures of his own most graceful position which certain of his devotees like to describe as the Arlberg crouch. A few years ago a skier who left tram-line tracks was conscious of a sense of sin. To-day he will invoke the great name of Schneider to justify his crime. I remember taking such a runner for a run. The snow was deep and heavy. Down the first slope he ran with his skis about a yard apart. He lost all control of his right ski and described a sinuous waggly track until he fell. A mild straight run followed down a slope about 20 degrees steep. He made once again the broad tram-line track, with his feet side by side —neither of them advanced. When he struck the outrun, where the snow was unusually heavy, he pitched forward on to his face. He never made the least effort to advance one ski ahead of the other, and consequently had no hope of standing.

I ventured to criticize his position and he remarked: "Don't be old-fashioned, the Arlberg crouch is all the rage to-day."

PROS AND CONS OF THE TELEMARK POSITION

The most determined opponent of the telemark position will find it difficult to deny the following propositions :

1. Longitudinal stability is, *cæteris paribus*, easier to maintain on a long than on a short base.
2. The telemark lengthens the base and therefore, *cæteris paribus*, increases longitudinal stability.
3. If you are taking a slope straight, lateral stability is usually easy to maintain, especially in soft snow. Longitudinal stability, on the other hand, will prove a real problem, especially if the outrun is abrupt or if the snow changes quickly in speed.

   Consequently, *cæteris paribus*, the long base is preferable to the broad base for straight running down the direct line of the slope.

No reasoning skier could dispute these propositions. By inserting the words "*cæteris paribus*" I have provided a formula which could be signed even by a man who disliked the telemark position. Indeed, the only possible line of defence is to maintain that the "*cæteris*" are not "*paribus*," in other words, that the advantages of the long base, as defined above, are outweighed by counter balancing disadvantages.

The opponent of the telemark position would argue as follows. My own comments are put in brackets :

1. The weight is mainly (but by no means entirely) on the front foot, and in consequence the position is cramped and more tiring than the normal position.

   [I agree, but hardly more tiring than the extreme crouch.]

2. Lateral stability may be easy to maintain in straight running down a slope, but on a traverse lateral stability may be more difficult to maintain that longitudinal stability.

   [I agree, and consequently do not recommend the telemark for traversing.]

3. There is little "give" in the position, consequently the skier who runs in telemark position on undulating or bumpy ground has no power to absorb the shocks.

   [I agree, but this argument tells not only against the telemark position, but also against the deep crouch.]

4. The disadvantage of taking a bump or a hollow in telemark position has been admirably summed up by Mr. d'Egville in his *Modern Ski-ing*, page 22. "The leading ski is flat on the top of the bump while the rear one is still coming up the hill, and when the leading ski is pointing down the far slope the rear one is flat on the top. This is clearly an unsafe position, and one in which it is difficult to control the skis and still more to keep them parallel."

   [I agree. See below.]

I admit, of course, that the telemark position like the extreme crouch is an emergency measure, and moreover, I agree that the ski-runner should regard the telemark as a position to *fall into*, rather than a position to *run in*.

There are, however, circumstances in which it is advisable not only to *fall into* telemark position, but also to *run in* the telemark position.

I remember running down a summit ridge which had been swept by the wind. Hard crust alternated with sticky sand snow which had been driven by the

STRAIGHT RUNNING

W. J. RIDDELL, E. W. A. RICHARDSON, W. BRACKEN

wind, snow with the consistency of glue. My friends were all enthusiastic believers in the Arlberg crouch and kept on pitching forwards each time they shot from fast into sticky snow. I adopted an extreme telemark position and felt quite comfortable. On another occasion, four of us took Lone Tree Slope in heavy snow. On this, as on the previous occasion, my friends were far better runners than myself, but I stood and they fell. When I reached the bottom I turned to watch my friends descending. They ran in a low crouch, the heavy snow packed itself against their shin-bones, and the result was much the same as if they had run into an elastic band stretched across the slope at the level of their shins. The snow gave, just as elastic gives, but it did not give enough, and they all pitched forwards on their heads.

Mr. Caulfeild had a similar experience when ski-ing with a Norwegian ambulance in the Vosges. He says :

" I was once running with them in fast spring snow with an occasional deep heavy pocket, and managed to keep right side up by running in telemark position while they, in the level-footed crouch, were taking frequent headers. They complimented me on my marvellous balance, and when I told them it was not my skill but the steadiness (in these conditions) of the telemark position, they thought it was my modesty. I was mean enough to let it go at that and my reputation for skill *and* modesty was made for keeps. In this case, of course, their ignorance was not exclusively Norwegian, and they at least had the sense not to *crab* the telemark position, and to take an interest in it—unlike the typical Arlberg

extremist who refuses to look at anyone in the telemark position for fear of having to see that it works better than the crouch at times."[1]

Ski-ing fashions wax and wane, and skiers ought not to be unduly impressed by the preferences of the local racing champions so far as turns and straight-running positions are concerned. I agree with Mr. Caulfeild that race results prove very little so far as these controversies on technique are concerned, or rather that racing seems to show that the best racers are born rather than made, and can get good results with very different styles. Consequently, it is foolish to exploit the result of any particular race as propaganda for any particular school. Lantschner of Innsbruck, a magnificent runner, carried all before him in the International University Ski Meeting at Davos in 1930, and the Arlberg School hailed his victory as the triumph of their technique, and published an article to this effect in the Austrian papers. A few weeks later Lantschner came in fifth in the International Race at Wengen, being defeated by Rubi, a Swiss, who often uses the telemark turn, and by three English runners, Jackson, Bracken and Tom Fox, whereupon an article appeared in the Swiss press condemning the Arlberg methods. At Wengen, Lantschner was sixth in the straight race and seventh in the slalom, whereas at Davos he won both. Neither race is an argument either for or against the Arlberg school.

David Zogg of Arosa, again, is a firm believer in the telemark turn, and also falls into the telemark position rather than into an extreme crouch in an

[1] *B.S.Y.B.*, Vol. V., p. 363.

emergency. Zogg beat all the Arlberg runners, not only in the Parsenn-Derby, but in the straight race for the Arlberg-Kandahar (1929), on their own ground. In 1930 Zogg finished tenth in the straight race and was beaten by some of the Arlberg cracks.

Again, in 1930, Mackintosh finished fifth in the straight race, a magnificent achievement, for there were 130 competitors, the élite of European downhill runners, and Mackintosh had flown out from England to compete in the race and was badly out of training. He was only 10 seconds behind the winner.

Mackintosh is a firm believer in the telemark turn, and falls into the telemark position for straight running when pressed. He defeated most of the local champions of the Arlberg Club who were racing on their own ground. Mackintosh's strongest point is his straight running. No less than six controls had been placed on the straight race-course by the local committee, which effectively eliminated all possibility of a stunt straight run. Miss Sale-Barker, who runs in an upright position, not approved of in the Arlberg, won the Ladies' Arlberg-Kandahar in 1929, finishing more than a minute ahead of the Austrian and German ladies. In 1930 she was disqualified for missing a control, and the Ladies' Arlberg-Kanhahar was won in magnificent time by a lady pupil of Schneider's. Leonard Dobbs, who has been three times British ski-running champion, is a telemark specialist; and Bracken, who has twice been British ski-running champion, never uses a telemark either for straight running or for turning. Miss Doreen Elliott, who won the Ladies' Race in the Swiss Championship of 1930, makes free use both of the telemark turn and telemark position. No member

of the Arlberg Club has yet won the Arlberg-Kandahar, a race which has always been held on their own ground. On the other hand, no club has such a consistent record of success in this event. The Arlbergers have just missed winning by the narrowest of margins.

I do not envy the partisan of any school, telemark or Arlberg, who attempts to make capital out of the above facts. The best evidence as to the relative advantages of different techniques is supplied, not by the ski-ing genius who is good enough to use a more difficult turn when an easier one is available, but by average runners who need all the help they can get and who, in my humble opinion, are at a great disadvantage if they are forbidden to use the telemark position for straight running on the rare occasions when that position is sound, and who are dissuaded from using the telemark turn in heavy snow.

Thanks, perhaps, to the success of David Zogg in the Arlberg-Kandahar and other races, there is a tendency in the Arlberg to modify their views on the telemark turn.

CONCLUSIONS

I have now, to the best of my ability, placed before the reader the pros and cons of the various straight-running positions. In conclusion, let me sum up my own views on the points that have been discussed in this chapter.

1. I believe in the single track in soft snow, except on a traverse. The skis should be kept rigidly together in soft snow and should not be very widely separated even on hard snow. Watch a good

jumper alighting on the hard beaten slopes of the jumping hill and note how narrow the gap between his ski.

2. The ski-runner should regard a more or less upright position as the norm from which he will only depart if special precautions must be taken to maintain his balance.

3. However upright your position, your knees must be bent forward and must be elastic. Stiff legs and knees are fatal to good ski-ing.

4. I advocate falling into telemark position if you are running from fast into sticky snow. The telemark position should be adopted for an abrupt change of gradient at the bottom of a steep straight run.

5. It is usually a mistake to run for any distance in telemark position. Try to recover your normal position as rapidly as possible after sinking either into a deep crouch or into telemark position. The telemark position is, however, sound if you are running on snow which keeps on changing rapidly in speed or texture.

6. The crouch is better than the telemark for bumpy ground, but you should straighten up between the bumps. As you strike the bumps, take up the shock by crouching, but don't run in an extreme crouch between bumps. The *Intermittent crouch* is the clue to good ski-ing.

CHAPTER VI

STRAIGHT RUNNING—DETAIL

NORMAL POSITION

IN soft snow, whether you run upright, crouch or sink into telemark position, keep your skis together and leave a single track.

As an insurance against a check in the fore-and-aft direction, one foot should always be slightly advanced, excepting to take a bump when the two feet should be side by side. If you examine the photographs of Schneider facing page 56, you will see that in neither position are his feet actually side by side. One foot is always in advance of the other.

Keep your knees loose, and emphasize the forward knee position. Even if you run in a very upright position, your knees can still be loose, well forward over the toes. Chin, knee and toes in a straight line is a rule which applies to all straight-running positions.

If your knee is well forward over the toes the weight must inevitably be well to the front. Concentrate on your knees, and you need not consciously aim at leaning forward.

One often hears bad teachers shouting to their pupils, "Lean forward!" The pupil who is given this advice usually stiffens his legs and bends violently forward from the waist. What could be

more insecure? You can test this for yourself by standing in this position without skis, straightening your legs and bending your body forward. Get a friend to give you a push in the small of the back. Then assume a position with knees loose and elastic, bent forward over the toes. Then get your friend to give you another push in your back. No further argument is needed.

Don't lean forward. Get your knees forward—a very different matter.

Keep your hands forward. Your hands should always be in front of your knees.

The first stage of a backward fall is indicated by a tendency in your hands to creep backwards. This backward creep should warn you that you are in imminent danger of lying down. Again and again I have saved myself from falling by bringing my hands smartly to the front.

Thanks to original sin the backward creep becomes more and more pronounced as the speed increases. At high speed the whole body cries out for the compromise of a nice soft backward *sitzmark* rather than a forward toss. Now is the time for resolute action. If you are determined not to fall, force your hands forward with a rush and the chances are nine to one that you will stand.

The backward creep is a mental rather than a physical phenomenon, and is so powerful that you will sometimes see a racer fighting to get his hands forward. He can only manage to force them forward an inch or two at a time, just as if they were being held back, not by human frailty and mental inhibition, but by iron fetters.

The beginner should keep his hands definitely in contact just below his knees. The wrists, indeed,

should be in contact with his knees. Contact is useful, because it is much easier to detect the first sign of a backward creep by the separation of two hands that have been in contact, than to realize that two hands which were six inches apart have crept back till the gap between them is twelve or eighteen inches. If they are kept in contact this is easily detected.

As the speed increases you should crouch ever lower, getting your hands ever further forward. Some good runners, notably Guido Reuge, ski with their hands practically touching the skis in front of them.

If you strike a bump you should give at the knees as the ski takes the bump, and crouch to take up the shock. Keep your feet side by side when striking a bump. A bump is, of course, a miniature jump, and no jumper takes off with one foot in front of the other.

As you reach the top of the bump, throw your hands smartly forward. If you land on the other side of the bump in soft sticky snow, fall into telemark position as you land. And then straighten up as soon as possible in order to have the maximum "give" to take the next bump.

If the slope suddenly steepens, be sure to emphasize the forward knee position. Your tendency will be to hang back and to straighten your legs. Exaggerate the forward bend of the knees and get your weight forward.

It is far easier to cope with a sudden increase than with a sudden decrease of speed.

There is much difference of opinion as to the correct technique to adopt when running from fast snow into slow snow. Clearly the leading foot

should be advanced, but the real problem is the distribution of the weight.

Is it best to lean back on the back foot, and to help the leading ski to ride over the checking snow by lifting your toe, forcing it upwards against the toe-straps, and thus lifting the point of the leading ski ?

Mr. Bracken is a firm believer in this method.

A rather similar problem arises in jumping. According to *Der Moderne Schisport*, the great Norwegian jumper, Carlsen, believes that the fore-and-aft pressure experienced in landing from a jump is best countered by keeping the weight on the back foot rather than on the advanced foot. Schneider and Baader are said to maintain that the weight should be on the leading foot.

My own view is that nothing is gained by weighting the back foot and that, on the contrary, the danger of a backward collapse is increased.

Let us assume that you are running at a speed of twenty miles an hour into snow, which reduces your speed to ten miles an hour. Whether you weight the back foot or the front foot, your ski speed will suddenly drop ten miles an hour, and the upper part of your body will suddenly dive forward at a speed of ten miles an hour. You cannot avoid this forward impetus of your body by leaning back and weighting the back foot. And I believe that this inevitable forward impetus is best countered, not by fighting against fate, but by boldly weighting the front ski and by driving it vigorously through the snow. If the check is really sudden, you should fall into telemark position, which alone provides an adequate defence against sudden pressure in a fore-and-aft direction.

TELEMARK POSITION

Advance the right foot (or the left foot if you prefer to lead on the left) about eighteen inches. In the extreme telemark position, which should only be adopted to resist an unusually sudden change of speed, the leading ski may be advanced three feet ahead of the other. The front knee should be bent well forward. The body should be erect from the waist upwards. It is a thoroughly bad fault to lean forward over the tips of the ski.

The single-track position must be held at all costs. If your skis separate you will find it very difficult to control the back ski owing to the fact that you are balancing on the toe of the back foot. If the two skis are rigidly held together, they do not require individual attention. The two move as one, and the front ski, which is under perfect control, helps to keep the back ski straight.

Keep your thighs in contact; this will help to keep the skis together. Both skis should be on their inside edges.

Straight-edged skis are rather easier to keep together than the normal "waisted" pattern.

Once the skis separate a dangerous fall is probable. The back ski runs out at an angle, turns over on its edge and trips you up, with the result that you pitch over the points of your ski.

There are two typical falls in the telemark position. The first is a backward collapse. The nervous ski-runner shrinks back, and brings the back ski forward, with the result that he collapses on to the back ski.

The other fall is a forward fall, but is none the less a funk fall for all that. The timid ski-runner

finds it very difficult to keep his ski together. His back ski begins to stray to one side, trips and throws him on to his face.

The good runner, as the speed increases, lengthens rather than reduces his base. He exaggerates the forward knee to prevent himself collapsing backwards on to the back ski, and he keeps his thighs glued together.

If you are expecting a powerful check at the bottom of a slope, you should run the first part of the slope moderately upright and fall into an extreme telemark position before striking the abrupt outrun. A moderate telemark position may produce a dangerous fall if you are running off a steep slope into heavy powder snow. As you strike the heavy snow, the body goes forward with a rush and the back ski is whisked off the snow. If you retain your balance, the back ski, of course, will fall back on to the snow, but it may bury itself point downwards, and, if this occurs, the point of the ski may be snapped off. I have seen this happen more than once, and have noted with interest the conviction of the ski-runners in question that they must have struck a hidden rock.

You can avoid this type of fall by lengthening your base. If your base is really long, a great deal of your weight is inevitably on the back ski, which is thus prevented from leaving the snow.

TRAVERSING

The normal position for a traverse is to run with the upper foot leading by about six inches. Both knees well bent (forward knee position).

The skis should be close together, but not actually

touching. In soft snow they should be two or three inches, on hard snow about six inches apart.

The telemark position, for reasons already explained, is most unsound on a traverse.

There are two very important things to remember :

1. Don't let the top ski lag behind. If it drops behind the weight will be, not on the foot, but on the toes, and the position will be that of a thoroughly untidy telemark position with none of the advantages of that position.

If your top ski lags behind a toe-spin is highly probable, and the evils of toe-spins have already been explained.

2. Don't hug the hill-side. The steeper the hill-side the more it is important to lean boldly down the hill.

If the slope is slippery, edge your skis into the hill-side by all means, but lean boldly outwards.

Don't pluck. A nervous beginner traversing a hard slope keeps on clutching the slope with his hand to steady himself.

The beginner should try and keep his lower hand touching the ankle of the lower foot. If he keeps his hands well down on the lower foot the weight will be on the lower ski, where it should be.

To prevent plucking keep your right hand (if your right ski is the upper ski, as is the case when traversing with the hill on your right) a few inches to the left of your right knee and close to it. Your right hand, in other words, should be about midway between your two knees. The right stick, in this case, will probably brush the right knee and may even be held in contact with it.

SIDE-SLIPPING

On a slippery slope side-slipping is often the best method of descent. Please read carefully the remarks about edging in Chapter X, page 98.

Slightly flatten your skis so that the lower edges of both ski are almost, but not quite, in contact with the slope. The skis will begin to side-slip. As they slip, lean outwards, otherwise you will probably fall into the slope. When you wish to arrest the side-slip, don't lean into the slope, but edge your skis firmly into the slope. If you want to stop suddenly, give a small jump and come down with your weight on the edges of the skis, edged into the slope. It is unnecessary to leave the ground. A suppressed jump is all that is necessary.

Side-slipping should be practised assiduously until the skier really enjoys the feel of side-slipping. The novice hates the sense that his skis are slipping away out of control. The good runner makes frequent use of side-slip, and at the end of a turn encourages the side-slip, unless there is some obstacle which calls for an abrupt stop.

Remember that there is usually no reason at all to check side-slip, or to feel the least unhappy because your skis are slipping sideways. So long as you lean out from the slope, you will not fall, and your skis in their own good time will come to rest.

CHAPTER VII

THE FUNDAMENTAL PRINCIPLES OF SKI-TURNING

TWO parallel ski moving in a straight line can be deflected and made to turn by one of four, and only four, methods.

1. The parallel position can be abandoned and the two skis, both weighted, can be held at an angle to each other. In this case one ski acts as the rudder and steering effect is inevitable,[1] for if two skis, both of which are weighted, are held at an angle they cannot run straight, except in one position of equilibrium, but must begin to turn until they reach that position of equilibrium. The telemark in heavy snow is a pure steered turn. The skis, held at an angle, are forced to turn until the front ski is horizontal.

[1] This seems the place to twit my friend d'Egville for certain remarks on page 15 of his book *Modern Ski-ing*. "A glance at the tracks of a telemark (which some writers call a steered turn) and a christiania or stem-christiania will divulge the fact that there has been a skid in all cases, the only difference being that, generally speaking (but by no means always), the telemark leaves the narrower track." I suppose Mr. d'Egville will hardly deny that a motoring turn is produced by steering, but there is often a touch of skid in a sharp turn if the road surface is slippery or muddy. The fact that in loose snow there is often an element of skidding at the end of a telemark does not in the least disprove the main theory, which Mr. Caulfeild was the first to enunciate, that the telemark is, in the main, a steered turn.

2. Two parallel skis can be deflected from a straight line by unweighting them and rotating them by body swing.

3. Skis can be stepped round as in the step-turn.

4. Skis can leave the ground completely as in the jump-turn.

To sum up, if you wish to deflect two parallel skis from a straight line, you can either steer them round, swing them round, step them round, or jump them round.

The telemark is a pure steered turn. The skis come round owing to the fact that both are weighted and that they are held at an angle to each other.

The pure christiania in which the skis are unweighted and then rotated by body swing is a swing.

The step-turn explains itself. The step-telemark is a combination of stepping round and steering, and the double lifted stem of stepping round and swinging.

The jump-turn explains itself.

SWINGS *versus* TURNS

The comparative utility of swinging and turning is discussed at length by Mr. Kuroda and Mr. Caulfeild in the *British Ski Year Book* for 1929. Mr. Caulfeild's distinction between swinging and turning is lucid and illuminating, and is, perhaps, the most brilliant analysis of a problem in ski dynamics in the whole literature of ski-ing.

The argument may be summarized as follows:

In the case of the swing, turning is the result of two movements. In the first movement the skis are unweighted, the skier crouches and then rises suddenly to an upright position. This body-lift

precedes the starting of the turn, the skis are actually unweighted just as the body *begins* to sink again. The rotation of the upper part of the body supplies the necessary impetus to turn the skis. The quotation that follows is from Mr. Caulfeild.

"Swing and steering can often be used alternatively, but just as often one (either) may be the only easy or even the only possible method and the other difficult or useless.

Steering has a special drawback. *It does not permit the very sharpest possible turning*—a spin on one spot without sideward curve; so that to stop in a narrow lane without running into the side is possible only by a swing, not by a steered turn. This does not mean, however, that a swing must always be sharper than a steered turn in the sense of taking up less room; for the spin of a swing may have to be followed by a side-slip that covers just as much ground as the curve of a steered turn, though not in the same direction.

Swing has three special drawbacks:

(1) *In very heavy snow it does not permit gradual turning.* A gradual curve by swing depends on free side-slip when the skis have been reweighted after the initial spin; when the snow is very heavy they stop skidding almost immediately after being reweighted, so that the turn must be virtually completed during the momentary unweighting and must therefore be abrupt. By steering, on the other hand, the curve-radius can, of course, be varied freely, whatever the snow.

(2) Even when the conditions permit gradual turning, *swing does not allow very accurate regulation and placing of the curve.* For when a curve is made

by swing its regulation depends on balance, which is not a very certain process ; whereas by steering, the curve can not only be varied freely, but placed with extreme precision.

The above two drawbacks make swing nearly useless among obstacles, especially in heavy snow, if varied curves rather than sharp turns are needed.

(3) *Swing is much less steady than steering in heavy snow.* The sudden reweighting of the skis after their initial unweighting, and the consequent sudden increase of snow-resistance, cause a much more abrupt check to the speed than the steady increase of pressure in a steered turn. The difference is negligible when the snow permits free side-slips and the skis are hardly unweighted, and is more than compensated for by the greater steadiness during the side-slip of the parallel ski-position than of an angular position. But in heavy snow, when complete unweighting is necessary, the difference is great, and a steered turn is then far steadier than a swing if the curve in both cases is equally sharp. Moreover, the steered turn has the further advantage that its curve can be widened *ad lib,* if the speed is beyond the safety-limit for sharp turning, while with swing it is sharp turning or nothing in heavy snow.

Mr. Kuroda says that swing is easier than steering for turning in heavy snow. This is only true as regards effort, and then only at very low speed ; otherwise in heavy snow swing is much the more difficult, for it takes far more effort (in resisting collapse) and far more skill in both ski-management and balance than steering.

It is clear, then, that swing and steering are alike indispensable, and that the school which barred

either would be of very little practical use. Evidently for light snow both are very useful, while for heavy snow steering is of far the greater use (at any rate for the average skier)."

NOMENCLATURE

Before proceeding to discuss the turns in detail it is necessary to explain the nomenclature which I propose to use.

An *uphill* turn is either a stop-turn from a direct descent or a turn into the hill from a traverse.

A *downhill* turn is a turn which connects two traverses.

Hill on the right. If you are traversing a slope with your right foot above your left foot, the hill is on your right and the fall of the slope is on your left.

CHAPTER VIII

CHOICE OF TURN

THERE is far less difference of opinion among experts as to choice of turn than many people imagine. It is, for instance, a mistake to suppose that the Arlberg School was the first to discover the obvious fact that the stem and stem-christiania turns are more generally useful than the telemark. Many years before the Arlberg School had been heard of, leading runners in the Alps had abandoned the telemark excepting for deep heavy snow.

I had certainly done so. Owing to a stiff right toe, I have to wear a spring binding (Schuster) on my right foot, the main disadvantage of which is that it renders the telemark turn to the right extremely difficult. When turning to the right I find it difficult to control my back foot, since spring bindings give very poor control when the heel is lifted from the ski. I consequently abandoned the telemark turn after my smash which occurred in 1909, and I have practically never used the telemark turn to the right since then. And because I cannot do downhill telemarks to the right in heavy snow, I evolved the double lifted stemming turn for this purpose (see p. 125). I mention these unimportant personal details merely to emphasize the fact that my own defence of the telemark is not due to personal bias

for that turn. As early as 1913, in my first book on ski-ing, I expressed a strong preference for the christiania. In Geoffrey Young's *Mountain Craft*, written before though published after the War, I wrote as follows:

"To sum up, make all your linked turns by stem-christiania, except in deep soft snow or breakable crust where the telemark should be used."

In *Cross-Country Ski-ing* (1920) I sang a regular pæan of praise on the merits of stem-christianias as "the safest, least tiring and most effective of swings."[1]

There is, of course, universal agreement among all good runners that the telemark should never be used on hard snow, or on hard snow covered by loose light powdery snow. The telemark, in brief, is not a "light snow" turn, but a "heavy snow" turn.

The controversy, therefore, narrows itself down to a choice of turn in deep heavy snow. Here, again, there is no difference of opinion between Herr Schneider and myself so far as downhill turning on steep slopes is concerned. We both advocate the stem-christiania with or without the lift.[2]

On gradual slopes (heavy snow) the christiania at *high speed* is as easy to start as the telemark (for it is only at low speeds that the christiania is

[1] See *A History of Ski-ing*, p. 277.

[2] The Arlbergers, by the way, while professing to abhor any kind of lift, actually lift just like other people if for any purpose they require a really short abrupt turn. I proved this to my satisfaction in the 1929 Arlberg-Kandahar race. In the course for the slalom I had set a sharp hairpin bend and had stationed Captain Curteis with a note-book to observe how many competitors did a pure stem and how many a lifted stem at this point. All the chief stars in the Arlberg firmament lifted, as I had fully expected.

difficult to start in heavy snow) and on the whole safer.

The christiania, then, should be used for low-speed turns on steep slopes, and for high-speed turns both on gradual and on steep slopes, however heavy the snow.

What is left ? The only room for difference is in choice of turn for low or moderate speeds on gradual slopes of heavy snow.

Now please observe that these are precisely the conditions which the beginner meets with far more frequently than the expert. High-speed turning and downhill turning on steep slopes are the monopoly of the good runner, and we are all agreed that the telemark should not be used in such circumstances. Low-speed turning on gradual slopes is the only kind of turning which the novice is likely to attempt. From which it seems a reasonable deduction that the beginner should be taught the telemark at the outset, and that he should use the telemark less and less the more expert he becomes.

Oddly enough, Herr Schneider denies the telemark to the novice (who needs it most) and permits the telemark (grudgingly) to the expert (who needs it least).

While grudgingly admitting that there is "something to be said for a runner who has thoroughly mastered the stem-christiania learning the telemark," Schneider refuses to teach the telemark to beginners.[1] In other words, the expert who seldom

[1] Schneider's views on these and other matters will be found in my *History of Ski-ing*, pages 355–376. I interviewed him in the Arlberg, submitting the interview in proof to his adjutant, Mr. Bernays. The interview was accepted as an official statement of the tenets of the Arlberg School.

needs the telemark may learn it, but the beginner who often needs it must not.

Why not? Two reasons are given for this concentration on the stem-christiania and stem, and for the virtual boycott of the telemark.

1. "If pupils learn to leave their inside ski behind they will find it difficult to bring it forward in the stem-christiania."

This, of course, is a matter of opinion. As Schneider does not teach the telemark, he is really not in a position to judge whether the telemark has this devastating effect on his pupils. I have helped hundreds of skiers to learn both the stem-turn and the telemark, and I have never noticed that those who master the telemark find the stem more difficult than those who have not.

2. "No loss of time in choosing between manœuvres."

Schneider, in other words, considers that it is best to concentrate exclusively on one turn. The one-turn skier, it is alleged, never wastes time or mental effort in choosing between two rival turns. The argument is not convincing. Even if you confine yourself to one turn, every time you turn you are in effect selecting one out of many possible alternatives. The precise moment at which you flatten the ski, the precise degree of edging, the correct distribution of weight between the ski, all represent a choice of one from a vast number of possible alternatives. Does Schneider lose time in choosing between these numerous alternatives? Is his mind a battlefield of conflicting desires? No, for he instinctively selects the angle and edge suitable for the texture of the snow. Similarly the catholic ski-runner, who is not restricted to the

christiania, instinctively falls into telemark position when the resistance of heavy snow suggests the advisability of that turn.

I deny that the runner who has learnt both turns is less single-minded when attempting to turn than the runner who concentrates exclusively on one turn. Even if I was prepared to admit that an occasional runner introduced telemark habits into his christiania turns, I should none the less advise him to continue practising both turns, indeed to perfect both turns rather than to drop one of them in despair.

Spanish and Italian are rather similar. The man who learns both languages simultaneously will often use an Italian turn of phrase when talking Spanish, and a Spanish word when talking Italian. No doubt the man who concentrates on Spanish will make a better showing in Spain, but there is none the less something to be said for learning Italian if you want to visit Italy, and something to be said for learning the telemark if you want to ski in telemark snow.

I have often noticed that moderate runners, who have been taught to shun the telemark like the plague, exhibit a strange dislike for soft snow. Indeed, whereas a few years ago hard, beaten and tracked snow was considered difficult and powder snow easy, the modern stem-christiania specialist rejoices in hard snow, but is at his worst in soft snow. He tends to play the game of "Follow my leader." You often see a broad highway running down open slopes of powder snow, and this tracked snow is made by people who cannot and will not telemark and who prefer to follow the leader and stick to tracked snow.

Nor is it only novices who find the telemark less exhausting than the stem.

The longest of downhill races, the "Inferno," the course of which is from the summit of the Schilthorn above Mürren to Lauterbrunnen, a vertical descent of over 7500 feet, has converted many an Arlberg protestant to ski-ing catholicism. The competitors have to begin with a climb of 3000 feet to the summit. In 1930 the snow was slightly on the heavy side, and most of the competitors were opponents of the telemark. Mackintosh used nothing but the telemark until he reached the level of Mürren. He gave a beautiful exhibition of easy, effortless ski-ing as he swept down the steep "Inferno" slopes above the Allmendhubel in a series of linked telemarks. All the other competitors abandoned the stem-christiania from sheer fatigue long before they reached Kandahar Gulley, and found, to their surprise, that the telemark was far less exhausting.

Walter Amstutz tells me that he was recently ski-ing on heavy spring snow on which he found the telemark, both for turning and straight running, the only possible solution. Formerly he had been rather inclined to adopt Arlberg views on this turn, but this experience proved decisive.

Here is another instance. Herr Fanck, the man of all men who made the Arlberg School famous throughout Europe, has taken recently to employing famous Arosa ski-runners for his films. Arosa is a steep powder snow district, and David Zogg of Arosa, one of the finest downhill racers in the world, is a firm believer in the telemark turn and in the telemark position for straight running.

The following is a quotation from a letter from Herr Born of Arosa. The same story was also told

to me by Herr David Zogg, with whom I discussed the telemark after his victory in the downhill race in the Swiss Ski Championship of 1930.

" When Zogg and the other Arosers," writes Herr Born, " took part in the filming of ' The White Hell of the Palü ' they had to do quite an amount of difficult ski-ing with heavy loads in deep spring snow. With them was Luggi Föger, the Arlberg champion, and some other good men of his club. In that heavy snow their stemming soon exhausted them so, that they fell time after time, and finally begged David to show them his telemark, which they soon mastered to their utmost satisfaction. And that night an historical event took place in the Boval Hut. Luggi Föger and his friends wrote a postcard to St. Anton with the following text which almost deserves world publicity : ' Lieber Hannes,—Von jetzt ab fahren wir Telemark ! [1] Signed Luggi Föger, Sepp Allgeier,' some more Arlbergers and of course all our rejoicing Arosa crew. At present Fanck is here turning a new film with about thirty Arosers doing the deep snow ski-ing for him."

There is one point in favour of the telemark which is entirely ignored by the Arlberg School. It permits of much easier and more accurate steering in heavy snow than the christiania. This is particularly noticeable in wood-running. The front ski can be steered with a much greater nicety with telemarks than with any other position, principally because, as Mr. Caulfeild observes, " it can be pivoted at once to anything up to a right angle."

Accurate steering in heavy snow requires much less skill in the case of the telemark because " the front ski," to quote Mr. Caulfeild again, " is easy to

[1] " Dear Hannes,—From now on we shall use the telemark ! "

manage and the other looks after itself, whereas in the stem-turn both skis require care."

The Arlberg prejudice against the telemark is probably due to the fact that when they condescend to do the telemark, which is very rare, they employ a form of telemark far less easy to steer than the pure telemark turn described in this book.

Herr Fanck, the author of *Wunder des Schneeschuhs* which made the Arlberg School famous, emphasizes the fact that the main secret of the telemark is always to start it from the normal running position with feet abreast by "quickly advancing the outer ski, *with a jerk quite unweighted*, to a pronounced angular position," and then at once to shift the whole weight to it, "a procedure which," as Mr. Caulfeild justly remarks, "gives the turn the essential character of the 'unweighted' swings." "My book, on the other hand," writes Mr. Caulfeild, "says that the telemark should normally be started from telemark running position, with both skis weighted, and should be steered from start to finish (unweighting the outer ski at the start is advised as an aid to sharp turning, but at low speeds only). . . . Assuming that the Arlberg method of doing the telemark is that advocated by Fanck, it is easy to see why the expert Arlberger never uses it instead of the christiania. For when it is done as a swing by unweighting and then fully weighting the front ski it is simply a christiania on one leg, and is obviously twice as unsteady as a christiania on two, without any redeeming advantages."[1]

In the same issue of the *Year Book*, Mr. Comey, in a vigorous defence of the Arlberg School, remarks that the Arlberg telemarks are "short, snappy, not

[1] *B.S.Y.B.*, Vol. V, pp. 156 and 162.

assuming the telemark position until actually turning," from which it would appear that the Fanck telemark is, in fact, the telemark taught in the Arlberg.

In conclusion, I should like to emphasize the fact that the controversy is not a controversy between those who advocate the christiania and those who advocate the telemark, but between those who restrict their disciples to the christiania and those who teach both christiania and telemark; in other words, between a protestant conception of ski-ing which shrinks in puritan horror from making things easy for its devotees, and a catholic conception which recognizes all channels of grace and permits its devotees to use the turn which is easiest for that particular type of snow.

I believe that the Arlberg School are slowly relenting, and I venture to prophesy that before long Herr Schneider will be teaching the telemark to his beginners.

CHAPTER IX

STEMMING

STEMMING is a generic term which includes snow-ploughing or double-stemming and also the pure downhill stem-turn.

Let us begin with snow-ploughing, which is not only a valuable manœuvre in itself, but is also a most useful preliminary exercise for the pure stem.

SNOW-PLOUGHING OR DOUBLE-STEMMING

Snow-ploughing is best learnt on a gentle slope of hard snow.

Select a gradient down which your skis will run comfortably. Start from rest with your skis pointing straight down the slope.

Push your heels as wide apart as you can, bring the points of your skis as close together as possible without the points touching or overlapping.

Your skis should now form a V, with the apex of the V pointing straight down the slope.

Both knees should be bent ("forward knee" position) and knocked. The knees should be almost touching and the heels thrust out as far as possible.

The result of this knock-kneed position produces the widest possible stem, and also forces the skis on to their inside edge, thus increasing the braking effect.

There are three special difficulties connected with snow-ploughing.

1. It is not difficult on hard, beaten snow to push out your heels and maintain the angle between the skis, but on soft snow you will soon discover that the resistance of the snow will force the skis together unless you make special efforts to keep them apart. For this reason, double-stemming and snow-ploughing in soft snow is particularly good practice. It is also hard work on untrained muscles.

2. The beginner gets into trouble with his ski points. They tend to cross. Here, again, nothing but practice will cure this little trouble.

3. At first you will find it difficult to keep the skis moving steadily straight down the slope. They tend to swing to one side or to the other. The cure for this trouble is to keep both skis evenly weighted.

You should practise snow-ploughing under varying conditions. Begin on a gentle slope of hard, beaten snow. Then increase the gradient until you can snow-plough down a reasonably steep slope (say 20°). At this stage repeat the practice in heavy snow.

It is, of course, much easier to start snow-ploughing from rest than to adopt the snow-ploughing position when travelling even at low speed. You should not be content until you can force your skis apart in heavy snow from a direct descent at fair speed.

An expert makes considerable use of snow-ploughing to reduce speed when it is inconvenient to deviate from the direct line of descent. In glacier ski-ing, for instance, it is most inconvenient for the second on the rope to control his speed by means of a turn which would carry him to the right

or to the left. Snow-ploughing saves him from overrunning the leader and enables him to follow his line. The cross-country runner, again, who is approaching a blind edge, naturally does not want to stop dead, and the restricted nature of the ground may preclude turning to the left or to the right. His best plan is to brake by snow-ploughing in order to arrive at the blind edge with his skis well under control. If all is well the other side of the blind edge, his skis can be brought parallel and given their head. If there is a fence or a rock, the skier is well placed for a stop-swing.

The best racers are always men with strong, well-developed leg muscles which enable them to drop into snow-plough position when travelling at high speed. I have often, for instance, seen Mackintosh and Bracken force their heels apart into stemming position when heading for a narrow gap, when a swing would carry them away from their best line to the right or left of the gap.

A NOTE ON THE DIAGRAMS

The diagrams in this book are numbered and correspond with the text. Thus " 3 " in the text refers to Position No. 3 in the diagrams.

THE PURE STEM

The pure stem is the basis of a good ski-ing style. I frankly confess that until I had visited the Arlberg I had never realized the beauty of this turn. It was only after I had watched Schneider, perhaps the greatest exponent of the stem, demonstrating it on the snow that I appreciated its finer points. The

perfection of his technique, the slow-motion accuracy of his turning filled me with admiration.

The diagram illustrates a pure downhill stemming turn.

Position 1 represents the normal traversing position. The lower ski will be the inside ski once the turn has started. The upper ski (1) will be the outside ski when the turn has started.

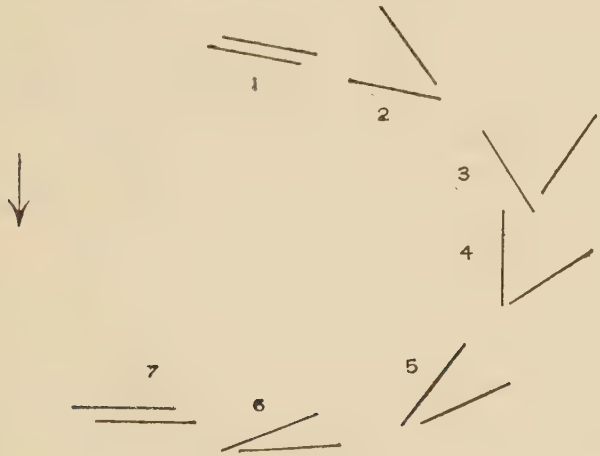

Fig. 1

Weight the lower ski and slide the upper ski unweighted to the widest possible stemming angle (2). Transfer the weight gradually to the outer ski and be careful to maintain the wide stemming angle (3). The knees should be knocked, and both knees in emphasized "forward knee" position. As the skis begin to turn downhill, be careful not to hang back or to relax the angle between the skis. The inside ski must lead throughout and must not be allowed to lag behind. The angle between the skis should not be relaxed until the lower ski has

begun to swing round to the horizontal (5). The skis can then be brought parallel (6 and 7), and meanwhile the inside ski should increase its lead, finishing definitely ahead of the outer ski.

Detail. The weight is transferred from the upper ski (2) because it is difficult to slide a weighted ski uphill. The upper ski (2) is therefore unweighted to enable it to skid round as easily as possible to the widest possible stemming position.

The beginner who has learnt to traverse has already been taught to keep the lower hand well down, if possible touching the ankle of the lower foot on the traverse. Similarly, for Position 2 the best plan for the beginner is to adopt the same position, touch the ankle with the lower hand in order to insure that all his weight is on the lower foot (see plate facing this page).

It is unnecessary to straighten the lower leg in Position 2. On fairly gradual slopes the knee of the lower leg can be bent well forward, but even on very steep slopes the lower leg should never be quite straight. The knock-kneed position, both knees well forward and nearly touching, with the heels wide apart, is the clue to this turn.

Positions 3 and 4 present special difficulties to the nervous beginner. Directly the skis begin to point downhill, he instinctively shrinks backwards, and also tends to relax the angle between the skis. Keep your hands well forward and low.

The great difficulty of this turn is the proper control of the inside ski. The outer ski starts to turn on its inside edge and remains on its inside edge until the turn finishes. The inside ski starts on the inside edge (1 and 2), then flattens (3 and 4) and finally ends on its outside edge (5 and 6). It

STARTING A STEM TURN

W. BRACKEN

THE FINISH OF A STEM TURN

passes from the inside to the outside edge through the intervening flat position.

This change of edge is the real difficulty of the turn. In order to avoid this change of edge, or rather to carry it through in the air, the inside ski is sometimes lifted. The beginner, however, should regard lifting as an emergency manœuvre. He must aim at the ideal of smooth, rhythmic turning, which is impossible once he starts lifting. Smooth turning depends on the management of the inside ski, and in particular on the control of the inside knee. The inside knee must be kept well forward.

To make the above clear, let me describe a pure downhill stemming turn to the *right*.

In Position 2 the right foot is the lower foot on the traverse. The right knee should not be directly over the ski itself, but some little distance to the left of it. A vertical line from the knee would strike the snow a few inches to the left of the ski itself. The right ski will be hard on its *inside edge*.

In Positions 3 and 4 your right knee will be directly above the ski, which will be nearly flat. At the end of the turn your right ski should be hard on its *outside edge*, and the right knee should be a few inches to the right of the ski itself.

In other words, the knee should describe a semicircular curve moving from the left of the ski to the right of the ski respectively.

It is this movement, a semicircular screw round of the knee, which insures smooth turning. You should practise this movement without skis on your feet.

The main trouble with the beginner is stiffness. He simply cannot relax. Instead of skidding round with the inside ski virtually unweighted, he

keeps his inside ski weighted and hard on its inside edge. He fails to flatten the ski at the right moment, and consequently the ski instead of skidding round unweighted, bites into the snow and runs straight across the other ski. Ability to relax is the hall-mark of the good runner. The secret of the stem-turn is to relax the ankle of the inside foot.

It is of the utmost importance not to let the inside ski lag, as a toe-spin will be the probable result. In other words, you will spin round on the toe of the back foot, and the result will be that well-known ski-ing manœuvre known as the "splits." The reason for this has already been explained (see page 42).

It is of the greatest help in this turn to look outwards at the beginning of the turn (over the *left* shoulder at turning to the right and vice versa) and to end the turn looking over the inside shoulder.

To sum up, the beginner should try to remember four things :

1. Never to let the inside ski drop behind.
2. To relax the ankle of the inside foot.
3. To maintain the knock-kneed "forward knee" position.
4. To flatten the inside ski directly the outside ski begins to point downhill.

THE IMPORTANCE OF THE PURE STEM

The pure stem itself is seldom used by experts, as the pure stem is a slow turn, and experts are usually turning at a speed which renders a stem-christiania preferable to the stem.

There is, however, a certain type of breakable crust on which the pure stem is the only possible

manœuvre. It bears your weight so long as it is distributed on both ski, but breaks the moment all the weight is thrown on to one ski, and can only be tackled safely by means of a pure stemming turn in which the weight is kept as nearly as possible evenly distributed between the two skis from the start to the finish of the turn.

The pure stem is easier on hard than on soft snow. Indeed, in heavy soft snow it is difficult and tiring, and in such snow the telemark is better for low-speed turning, and the stem-christiania for high-speed turning.

There is, however, one variety of soft snow in which the stem-turn is preferable to any other turn. Candidates in the British Second Class Test are required to perform four continuous stem-turns in soft snow. The Instructions to Judges, for which Mr. Caulfeild is responsible, provide an admirable and lucid explanation of the value of the stem-turn under such conditions :

" The object of this part of the qualifying Test is to provide a turn for soft-snow conditions in which the telemark and other turns are unreliable.

In Uniform deep soft snow the telemark is quite steady and safe and much easier to execute than any other turn. It is therefore required in part (*b*).

In Irregular soft snow of varying depth or consistency—patchy, rutted or liable to slip suddenly from an icy underlayer—the pure, or nearly pure, stem-turn is steadier and safer than the telemark or any other turn, and is therefore required for this part of the test. On such snow the telemark is unsteady and, when the snow-depth varies, sometimes dangerous, for if a barely-hidden rock is

encountered the back knee is liable to strike it ; the pure christiania, by body swing, is more difficult than the telemark and also unsteady , the ' open christiania ' (steered turn in scissors position) is still more so, and, moreover, is always dangerous in soft snow, for the skis, if mismanaged, are very liable to run apart and twist the knee badly."

Finally the pure stem is the basis of the stem-christiania, the most generally useful of all turns.

CHAPTER X

THE TELEMARK TURN

THE telemark turn, like the pure stemming turn, is a steered turn.

Rudder-steering, as Mr. Caulfield was the first to discover, takes place when two ski are held at an angle and if both ski are weighted.

If one ski is exclusively weighted, it will normally continue in a straight line.

The telemark used to be considered a one-foot turn, and beginners were taught to keep the weight throughout entirely on the leading foot. If the telemark were merely a one-foot turn, it is difficult to see why anybody should ever get into the rather strained telemark position. If the turn is all made on the leading foot, why crouch down on the leading foot? Why not stand erect and make a jerked christiania on one foot, taking all the weight off the other ski?

The object of falling into telemark position is only clear once you accept the rudder-steering hypothesis, for then this position is justified by the fact that it is difficult in heavy snow to hold the skis at an angle without getting into telemark position. The telemark position is useful in order to ensure the greatest steering angle between the ski and to achieve the greatest steering effect, for, other things being equal, the steer-

ing effect depends on the angle between the ski.

The telemark is, as I have said, a steered turn. It is important to realize that edging the ski has no effect on turning, though if the skis are incorrectly edged turning may be prevented.

It used to be thought that edging the ski inwards caused the ski to turn inwards. This is a complete fallacy.

There is only one form of turning in which edging actually assists turning. A telemark turn in breakable crust is not done by steering, but by hard edging of the ski ; and even in this form of telemark

Fig. 2

turning is due, not so much to the edging of the ski, as to the curvature of the upturn of the ski.

In every other form of turn edging plays a negative rôle. If the skis are hard edged, the ski will not begin to side-slip. If the edging is relaxed, side-slip becomes possible.

When a motorist puts on his brakes his speed is reduced, and if he releases his brakes his speed increases ; but the brakes do not cause the speed, though they may reduce it. Similarly, if the skis are hard edged side-slip will be prevented ; the hard edging acts as a brake, and if the edging is relaxed the side-slip will become possible ; but the edging does not cause the side-slip, though it is capable of preventing it.

In Fig. 2 (A) the cross axis of the ski is at right

angles to the leg and the whole ski is strongly edged into the slope. It is obvious that in this position side-slip is normally impossible, and that the ski will tend to continue in a straight line across the slope.

B appears at first sight ideal for side-slipping, for the ski is parallel to the slope, and on a slope of hard smooth snow the ski would certainly slip down the slope in this position, but in soft snow, if the ski is held quite flat, the outside edge of the ski must catch in the snow and prevent side-slipping. The outside edges of the ski must therefore be lifted in order to facilitate side-slipping, but must not be lifted too far, otherwise the inside edges tend to cut into the slope and prevent side-slipping.

In other words, the ideal position for side-slipping is somewhere between Diagram A and Diagram B. The ski must be weakly edged inwards, and the ankle slightly relaxed.

To start the turn the ski must, as explained above, be slightly edged. This slight edging merely makes the turning movement possible, but does nothing of itself to produce turning.

I do not want to burden the beginner's mind with directions about edging the skis in the telemark. If he follows the instructions given below he will almost automatically edge the skis correctly. Mr. Caulfeild used to give intricate instructions for edging in the telemark, but I believe I have managed to persuade him that it is best to concentrate on the position of the leading knee and on keeping the skis together rather than to worry about edging.

PREPARATORY EXERCISE

The following preparatory exercise may be useful to get the feel of the telemark.

Stand erect with your feet together. Now advance one foot until it is about three feet ahead of the other and your body erect from the waist upwards.

Bend the front knee well forward ("forward knee" position), and screw the front knee forward and inward and the heel outwards. This inward screw of the front knee emphasizes the forward knee

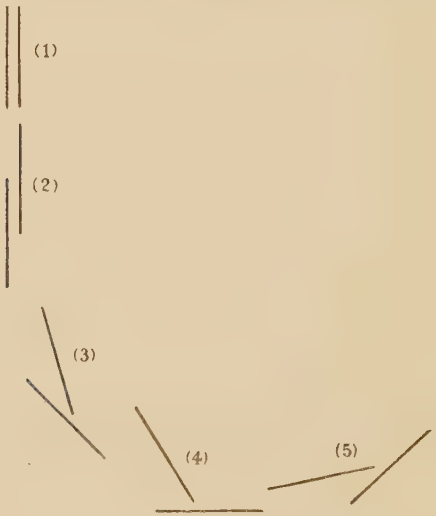

Fig. 3

position, and the outward screw of the heel produces the telemark turn.

Some beginners find it easier to get the feel of this turn by practising it on a very gentle slope of hard, beaten snow. On such snow the skis skid round very easily.

STOP TELEMARKS FROM A DIRECT DESCENT

Assume the normal position for straight running with the knees rigidly together, then drop into telemark position by advancing the right ski if you

intend to turn to the left and the left ski if you want to turn to the right.

Advance the leading ski far enough for the upturn of the back ski to rest against the ankle of the front foot. It is a good plan to attempt to keep the upturn of the back ski tucked into the ankle of the leading foot throughout the turn. This keeps the skis together.

Both skis should be held rigidly in contact and the knees should be bowed inwards. The front knee should be in emphasized " forward knee " position, and the back knee should also be well bent. You are now in position to start the turn.

This turn is a steered turn and you will make things more difficult for yourself if you try to lean inwards. What you have to do is to emphasize the " forward knee " and screw the front knee inwards and the heel of your leading foot outwards.

The inward screw of the knee and the outward screw of the heel starts the ski turning.

Keep the outside shoulder well back and put the weight mainly, but not entirely, on the front foot with the knee still bowed inwards.

You will now swing round to a horizontal position. As the turn finishes the weight comes more and more on to the heel of the leading foot.

Detail. The most important thing in this turn is to keep the skis rigidly together before starting the turn and to prevent the back ski coming up with a rush as the turn proceeds.

The narrow track is as essential for the telemark turn as for the telemark position in straight running. If the two skis are held together, they move as one and do not require to be controlled separately. The back ski, if allowed to stray from its fellow, is

difficult to control owing to the fact that the heel of your back foot is off the ski so that you are virtually balancing on the toe.

The telemark turn is produced by the steering effect of two skis both weighted and held forcibly at an angle to each other. This angular position takes a little holding. Some force is required, and the tendency of the beginner is always to shrink from the application of force. When the turn starts the pressure on the leading ski (and it is this pressure which, if resisted, causes the turn) tends to force the two skis parallel to each other; the beginner is tempted to yield basely to this pressure, instead of glorying in it and emphasizing it.

He tends to relax the angle between the skis and to allow them to run together, and in this case the turn fails.

Beginners are in a hurry. They feel that the turn is hanging fire, and they try to hurry the turning effect by leaning in, and by bringing their outside shoulder round. (The outside shoulder means the shoulder on the outside of the curve made by the turn, the right shoulder when turning to the left, the left shoulder when turning to the right.)

This tendency to force the turn by leaning in can be checked if the beginner resolutely keeps his eyes fixed on the point of his back ski.

The analogy with golf is obvious. In golf it is essential to keep your eye on the ball, not because you want to watch the ball carefully as you hit it, but because keeping your eye on the ball prevents your head moving, and prevents the head and shoulders coming round before the swing is completed. The golf swing and the ski-ing swing have something in common. Keeping your eye on the

point of the back ski serves much the same object as keeping your eye on the ball; it prevents the shoulders coming round.

Another great difficulty in this turn is that the beginner refuses to realize that he can skid round comfortably with most of his weight on one ski. He does not feel happy unless he is securely placed with his weight evenly divided between both skis. Directly the front ski starts skidding round he feels a nervous desire to bring up the back ski as a support. This is fatal. The back ski must be kept rigidly in the rear, and for this reason it is of the greatest importance to keep the upturn of the back ski tucked into the ankle of the leading foot throughout the turn.

In starting the turn it is important to get into telemark position and then to start the telemark turn. Don't run these two movements into one, until you are fairly expert.

If the turn hangs fire, the cause for this is one of four things: (*a*) pushing forward the front foot and straightening it instead of emphasizing the "forward knee" position, or (*b*) weighting the front foot exclusively, or (*c*) failure to edge the leading ski (a point with which I shall deal later), or (*d*) bending forward from the waist instead of keeping the body erect.

A beginner often starts the turn with the whole body bent so far forward that a vertical line from his forehead would pass through the ski about halfway between the binding and the upturn. This is an extremely unsteady position.

Sometimes the turn starts, but the skis run away and refuse to come round. This is due to a failure of will. Instead of resolutely holding the skis at an

angle and continuing to screw the leading knee inwards and the leading heel outwards, the beginner gets frightened and surrenders to the attempt of the skis to run together again. A long unsteady turn is also due to the same failure to maintain and to emphasize the angular position between the skis, and is occasionally due to letting the weight come back too much on the back ski. An unsteady finish is usually due to bringing the back ski up with a rush because you feel you cannot balance comfortably on one ski. You can!

An inward fall at the finish is due to trying to force the turn by leaning in. Keep the outside shoulder back and keep your eye on the point of the back ski. It is extremely rare for the beginner to fall outwards, and any attempt to counteract the outward impetus is usually fatal.

An outward fall is only likely in snow in which there is a slight catch, such as soft snow covered with a thin soft layer of breakable crust. The remedy in such snow is not to lean in at the beginning of the turn, for this is always fatal, but to whip round the shoulders just as the turn is completed. This needs accurate timing, for if the shoulders are brought round too soon the turn hangs fire.

A common fault is to overdo the turn. The skis whip round too fast, and on a steep slope this may result in a backward fall. The cause of this is too much heel weighting at the end of the turn. At the end of the turn you should throw your weight on to the toe of the leading foot rather than on to the heel.

In heavy snow beginners sometimes pitch forward at the end of the turn. This is due to leaning forward, with the result that the beginner topples over his ski points, especially if the turn brings him to a rather

sudden stop. There are two remedies for this mistake. The first is to keep the shoulders back and to "thrust the stomach proudly forward." The second, which may be employed in heavy checking snow, is to lengthen your base when you have swung round to the horizontal. Thrust forward the front ski, but be careful not to straighten and poke forward the front leg. The "forward knee" position must be maintained throughout.

Crossing the ski at the back is an irritating and dangerous fault. The remedy is to emphasize the "forward knee" position. You cannot cross if the knee of your front foot is well forward.

As most beginners find it difficult to master lengthy directions, I have purposely omitted any allusion to edging the skis. Most skiers naturally edge their skis correctly in this turn provided that they emphasize the "forward knee" position, and screw the knee inwards to the curve and the heel outwards. The exceptional beginner may perhaps have some difficulty in starting the turn through incorrect edging, either by edging the leading ski too much or too little. If the outside ski remains quite flat it will, for reasons already explained, skid round with difficulty, especially in heavy snow. Similarly, if the outside ski is over-edged skidding may be impeded.

UPHILL TELEMARK FROM A TRAVERSE

The telemark turn should never be used as a stop-turn on a *steep* slope whether the snow is heavy or hard. On steep slopes the christiania should always be employed for uphill turns from a traverse.

On a very gradual slope of heavy snow, an uphill telemark is sometimes best as a stop-turn from a traverse. The only difference between this turn and the telemark turn from a direct descent is in the preliminary edging of the ski. As the ski-runner is traversing, his ski will be edged into the hill in a position similar to Figure A on page 98.

I have already explained that this position makes side-slipping difficult, if not impossible, and consequently, in order to start the ski turning, it is necessary to relax the ankle and slightly flatten the

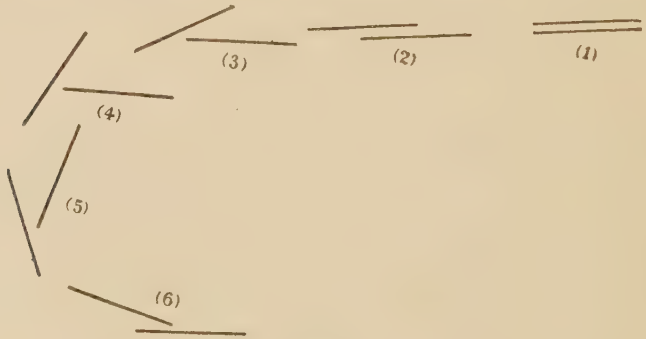

Fig. 4

ski, to assist its skid round to the angular telemark position.

The beginner must be on his guard against leaning in towards the hill-side. As his skis begin to skid downwards and outwards his natural tendency is to feel that they are running away from him, and in order to maintain his balance he leans inwards. This is fatal. He must overcome this tendency by deliberately leaning outwards away from the hill.

Once he has overcome his temptation to lean in towards the hill-side he will find that a telemark is much easier from a traverse than from a direct descent. It is naturally easier to thrust the leading

ski to an angular position from a traverse, as gravity assists the heel end of the ski to slide downhill.

THE DOWNHILL TELEMARK

The main difference between the downhill telemark and the uphill telemark is that the angular position between the skis has to be maintained much longer, and that it is more difficult to force the skis into this angular position.

The uphill telemark from a traverse is very easy, because the heel end of the leading ski has merely to be driven *downhill* in order to force the leading ski to the proper angle.

In a downhill telemark the turn is started by forcing the heel end of leading ski *uphill*, and this is naturally more difficult.

The sharper you wish to turn the greater must be the angle between the skis ; and in general the angle between the skis must be greater in a downhill turn than in an uphill turn, for reasons that are obvious if the reader compares Diagram 3 and Diagram 4. For the turn to be sharp there must be no delay in bringing the leading ski to the widest possible angle ; and since it is difficult to slide a weighted ski uphill, it is best to transfer all the weight on to the back ski to start the turn. Getting the weight on to the back ski does not mean collapsing on to the back ski ; and in order to avoid collapsing on to the back ski *the position of the back leg from the hip to the toes must remain absolutely unchanged*. You should get your weight on to your back ski, *not* by bending the knee of your back leg, but maintaining unchanged the position of your body below the waist while

bending backwards *from your waist* as far as you possibly can.

It is most important to get this position absolutely correct, and the beginner would do well to practise it several times in his room before he puts his skis on.

The illustrations below clearly indicate the right and wrong methods of starting the downhill telemark.

Fig. 5. Starting a Downhill Telemark (correct)

From the normal position for traversing fall into telemark position with the upper foot leading, knees bowed inwards and the skis held rigidly together. Lean back *from the waist* only. The outside shoulder should be kept well back and should not be allowed to come round in preparation for the turn. Relax the ankle of the leading foot, and flatten the leading ski. The weight will now be on the back foot.

Emphasize the "forward knee" position of the leading foot, bow the knee inwards and the heel outwards so that the outside ski makes a wide angle with the back ski. The resistance of the heavy snow to the leading ski will now increase rapidly, and it is most important not to yield to this resistance, or to allow the angle between the skis to relax.

FIG. 6. Starting a Downhill Telemark (incorrect)

The leading ski will now begin to point straight downhill. It is vital at this moment not to hang back, but firmly to hold the angular position between the skis. The eyes should be fixed on the point of the back ski and the outside shoulder should be kept well back. The upturn of the back ski should be kept tucked into the ankle of the leading ski.

The skis will now begin to swing round to the

horizontal. The second half of a downhill telemark turn is exactly the same as a stop telemark from a direct descent and therefore requires no separate description.

The real difficulty of the turn is to keep your wits about you when you reach Position 4. The beginner tends to lose his nerve the moment his skis begin to point downhill. He feels that if he does not do something desperate his skis will dive straight down the slope. And so, of course, he does the one thing which will inevitably produce the one result which he fears. If he wishes to prevent his skis taking control and diving straight downhill, he must go boldly *forward*, not shrink weakly back. He must emphasize the angle between the ski instead of weakly relaxing. He must " thrust his stomach proudly forward," to quote Mr. Caulfeild's sound if inelegant advice, instead of hollowing his stomach.

The following are bad faults : (1) To shrink back and sit on the back ski. (2) To poke forward and straighten the front leg instead of emphasizing the " forward knee " position. (3) To yield to the pressure on the ski instead of fighting against the pressure which is trying to force the ski together by firmly screwing the heel of the leading foot outwards and downwards at the end of the turn.

Keep the body erect. Thrust the stomach forward. Keep the leading knee well forward. Screw the leading heel outward and above all don't hang back. If you straighten the front leg a fall is certain.

One word more. The track of a properly executed, downhill turn shows two straight lines connected by a quarter moon as in Fig. 7. If your track looks like B, as it well may if your earlier attempts at a downhill telemark are done on a very gradual

slope, you may be certain that your methods are wrong and that this kind of long, draggled turn would be of no use to you whatever on any slope above 15 degrees. In B the skis have run apart at the beginning of the turn, and there has been very little steering action between them at the middle of the turn as the ski-runner has basely yielded to the resistance against the leading ski, rather than

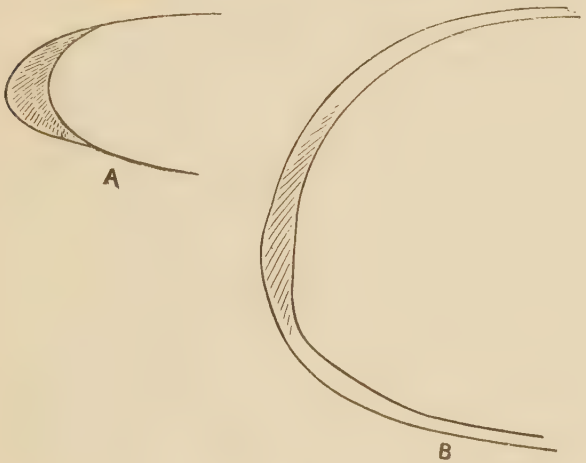

Fig. 7

joyously emphasizing this resistance. In a properly executed telemark there is always a bank of snow thrown up by the leading ski, which bears witness to the ski-runners' joy in the steering effect produced by the rudder ski. The double tracks at the end of the turn in B show that the ski-runner has brought his back ski up with a rush, and has not dared to trust himself to his leading ski.

It is just as important in the downhill as in the uphill telemark not to bring up the back ski with a rush.

THE STEP-TELEMARK

The step-telemark was either invented by Mr. Caulfeild or, at least, analysed by him for the first time. It is a useful turn, but I think rather less useful than the lifted stem-christiania for sharp turning in heavy snow.

On a steep slope the beginner's difficulty is to prevent his skis running away from him. Owing to the steepness of the slope it is difficult to bring the front ski into a wide enough angle in order to ensure a sharp turn. For slow turning on steep slopes the step-telemark is easier and better than the ordinary telemark, because it is easier to lift the outside ski to a wide angle with the back ski than to skid it round to this angle.

The step-telemark is best learnt from rest. Stand erect with your skis across the slope, and *lift* the upper ski right round until it makes the widest possible angle with the lower ski, so that it points nearly straight down the slope. Now throw your weight forward on the outer ski, and slide forward on the outer ski ; you can then finish the turn very sharply as an ordinary telemark from a direct descent. The most important point in the step-telemark is to keep your shoulders square with the back ski. If you allow your outside shoulder to come round, your turn will fail and the leading ski will run straight downhill.

THE STEM-TELEMARK

The stem-telemark is a very useful manœuvre. In very heavy snow it is often an advantage to start the turn as a stem-turn and then to drop into

telemark position and complete it as a telemark. However heavy the snow there is usually no difficulty in *bringing* the skis into stemming position, but it may be difficult to hold them in this position. If you are tired, you will often find it useful to complete the turn as a telemark.

THE TELEMARK IN SOFT BREAKABLE CRUST

This turn is very useful and requires less effort than the jump-turn. It differs completely in execution, though very little in appearance, from the ordinary telemark. In crust the telemark is not a steered turn at all. Turning takes place owing to the fact that the upturn of the inner ski cuts round. The important thing in this turn is not to be in a hurry. There is a moment when it seems incredible that the skis will turn. Hang on to the position with your inside ski hard on its edge and the inside knee well over towards the centre of the course, and the ski will suddenly whip round.

CHAPTER XI

THE CHRISTIANIA SWINGS

IN the two preceding chapters I have described the pure stem and the telemark, both of which are steered turns. The stem-christiania, which is the subject of the present chapter, is in the main a pure swing carried through by body rotation, though an element of steering sometimes starts the swing.

The stem-christiania might also be described as a cross between the pure christiania and the stem-turn, much nearer in its general characteristics to the former than to the latter.

The essential principles of the stem-christiania will be more easily understood if I begin by describing the pure christiania. I wish, however, to emphasize the fact that the beginner should not attempt the pure christiania until he has mastered all the other turns. The pure christiania, for reasons to be explained below, is not a very generally useful manœuvre.

THE PURE CHRISTIANIA

To practise, select a gentle slope of hard-beaten snow.

Run down the slope in normal position with the knees well forward and skis together and a slight crouch. The swing is effected by two movements,

THE FINISH OF A CHRISTIANIA IN SOFT SNOW

W. J. RIDDELL

(NOTE FRONT SKI WELL AHEAD)

the first a straightening movement, the second a sinking movement.

Straighten up and, just as you begin to sink again, twist your knees round at right angles to the line of motion, swing the hips round to the right (or to the left if turning to the left). The skis will then skid round rapidly at right angles to the original line of movement.

At the moment when the straightening movement is completed, and just as the body begins to sink again, the skis will be unweighted. The object of rising to an erect position and then sinking is to unweight the skis, which are thus easily deflected from their line of motion.

Mr. Kuroda, by the way, points out quite correctly in an interesting article which he contributed to the *British Ski Year Book* (Vol. V, p. 156), that the unweighting must occur, not during the lifting of the body, as Fanck says, but just as the skier is beginning to crouch again.[1] "But Mr. Kuroda forgets," writes Mr. Caulfeild, "that if the turning takes place with the skis unweighted the whole turn must be completed in about half a second, for half a second at the very utmost is as long as the unweighting can last however it is done (and must therefore be very abrupt)."

A stop-turn by this method is hardly possible in heavy snow, is unsafe except at low speed, and is therefore not of very great general use. At low speed on very hard snow the downhill pure

[1] I have tested these theories on a weighing machine. My weight is about 11 stone. If I crouch suddenly the pointer swings back to about 4 stone and then forward to about 17 stone, returning at once to 11 stone. If from a crouch position I straighten up suddenly, the pointer first swings to 17 or 18 stone and then at the top of the straightening-out movement drops to 3, 2 or 1 stone.

christianias can be carried through by the same method.

THE STEM-CHRISTIANIA

The stem-christiania proper is more of a swing than a turn. The initial stemming with the consequent slight steering action is only used to start the turn. The degree of crouch will depend on the speed at which you are running. Even if you are virtually erect the knees should still be bent well forward, partly for reasons already explained and partly to leave more margin for straightening up. Stem with the intended outer ski (the left ski in turning to the right, the right if turning to the left). A slight stemming angle suffices at high speed. Generally speaking, the higher the speed the smaller the preliminary stem. As you stem, straighten up and then immediately sink into a semi-crouch. As you sink, transfer all your weight to the outer ski and swing your hips and ski round. The skis, which were momentarily unweighted. at the top of the straightening movement, now receive the full weight of the body (which is mainly on the outer ski) and as the body sinks into a crouch position, the skis swing round as the result of the impetus thus imparted to them.

The turning movement is, as Fanck correctly points out, started by pivoting with body swing on unweighted ski, but is completed by the impetus of the body imparted to the ski as the weight comes down on to them.

The difference between a pure christiania and a stem-christiania is that whereas in the former turn the turning takes place entirely with the skis unweighted, the stem-christiania turning movement

is started on unweighted ski and is completed with the ski weighted.

Detail. The management of the inside ski is as important in this manœuvre as in the pure stem. The inside ski skids round almost or entirely unweighted, and should be skidded round well ahead of the outside ski, for if it lags behind a toe-spin will result. The higher the speed the more pronounced should be the lead of the inside ski.

Once the turn starts you must make a definite effort to turn the inside knee over to the right if you are turning to the right, or to the left if turning to the left. Turning over the knee automatically flattens it and helps it to skid round. The difficulty in this turn, as in the stem-turn, is to prevent the inside ski remaining hard on its inside edge and proceeding in a straight line instead of skidding round.

At high speed keep your hands well forward and exaggerate your crouch towards the end of the turn. A very low crouch helps to prevent your body being thrown outwards. Beginners should keep their hands in contact in the position already explained, and for the reasons already given, in the chapter on Straight Running.

I do not advise you to bother about leaning inwards at the end of the turn. Ninety-nine ski-runners out of a hundred tend rather to overdo than to underdo this inward lean; your instinct is to overdo the inward lean, and your real difficulty will be to prevent oneself falling inwards.

Indeed, on slippery snow it is an excellent plan to try to touch the snow with your hand on the outside of the curve (left hand when turning to the right, right hand when turning to the left).

Rhythm is the secret of easy turning in this as in so many other ski-ing movements. Rhythm again depends on correct timing of the *rise and dip*. The rise as already explained unweights the ski, and the dip shifts " the body's centre of momentum off the previous line of motion, and thus into a position to start the skid " (Arthur Comey).

It is a good plan to count, one, two ; one for the rise and two for the dip.[1]

All these instructions apply equally to the stem-christiania from a direct descent and to the downhill stem-christiania.

It is a great help to look over one's outside shoulder at the start of a downhill stem-christiania and to finish looking over the inside shoulder.

THE STEM-CHRISTIANIA FROM A TRAVERSE

A telemark should never be used for an uphill turn from a traverse even in heavy snow. It is, of course, much easier to turn into the hill from a

[1] With reference to this rise-and-dip movement, Mr. Caulfeild wrote as follows in the *B.S.Y.B.*, Vol. IV, p. 438 :

" Bernays says, ' Then came Schneider with his discovery that the christiania was started by a subdued jump.' No doubt Schneider found it out for himself, but he was not the only discoverer. It was alluded to in English long before Schneider, or at any rate his ideas, had been heard of by Englishmen, the first British mention, so far as I can make out, being by your noble self in *Cross-Country Ski-ing* (published 1920). I wish I could say that I had been the first to announce it, but I certainly wasn't, so I am reluctantly compelled to suppose that I got it from you."

Actually there is a reference to unweighting the ski in Mr. Caulfeild's first book, *How to Ski*. I had forgotten this reference and probably read it at the time without in the least understanding its significance. I rediscovered the principle independently, and Mr. Caulfeild, who had forgotten his own discovery, was " reluctantly compelled to suppose " that he got it—from me.

traverse than to make a stop-turn on the level from a direct descent, as in the former case gravity helps the ski to skid round once the turn has been started.

The christiania from a traverse is a very easy mánœuvre, and is effected by the rise-dip movement that has already been described in detail. If you are running in the normal traversing position, begin by exaggerating the "forward knee" position, straighten up and without pausing sink again. As you sink thrust your heels down the slope. The ski will immediately skid round, the rear end skidding down and the points skidding up the slope.

It is a great help to keep the skis fairly close together as this helps them to turn as one. Beginners sometimes make a convulsive movement on one ski stemming with the lower foot. This is not so neat or effective a method as the one which has just been described.

THE OPEN CHRISTIANIA

The open christiania is started by diverging instead of converging the skis. This diverging movement introduces an element of risk. If anything goes wrong, the skis fly apart and produce "splits." I have known many cases of skiers who wrenched their knees as the result of doing a split at the end of an open christiania. The heavier the ski the greater the risk of "splits," which is one of many reasons why jumpers, who use particularly heavy skis, in general far prefer to stop by means of a stem rather than an open christiania when they reach the level.

Experts in open christianias run far less risk of the "splits" than more moderate performers, but even

the expert cannot insure against the outside ski catching in some invisible object below the surface of the snow, such as a hard lump of ice or an old rutted track or even the twigs of a small bush. Such an obstruction almost inevitably produces "splits" when the skis are divergent, whereas if they are converging the obstruction tends to ram the skis more closely together.

Of course, we should all have to learn the open christiania if it could be proved that it had achieved any object which was not achieved more easily and more safely by some other turn. But as there is no variety of snow or ground on which the open christiania is either easier, safer or faster than the stem-christiania, and as there is no result that can be achieved by diverging which cannot be achieved more easily and more safely by converging, I offer no apology for omitting from these pages a detailed description of the open christiania. I am glad for once to find myself in cordial agreement both with Hannes Schneider and with Vivian Caulfeild on this point.

THE LIFTED STEM-CHRISTIANIA

The main difficulty of the pure stem and stem-christiania is, as I have already explained, the change of edge of the inside ski. In the downhill stem or stem-christiania the outside ski starts and finishes on its inside edge. The inside ski, however, starts on its inside edge, and finishes on its outside edge; this change of edge is sometimes difficult if the ski is kept in contact with the snow, especially if the snow is rutted. It is easier to make this change of edge with the ski in the air, hence the ski is sometimes lifted.

PREPARING FOR THE LIFTED STEM

LIFTED STEM, HALF-WAY ROUND

NOTE POSITION OF INNER SKI, WELL AHEAD

Lifting, however, is not in itself desirable and the skier should lift as little as possible.

Lifting is only permissible in the following circumstances :

Lifting is a great aid for really sharp turning. Sharp turning is, of course, a *pis aller*. Other things being equal, the skier will naturally wish to take off as little speed as possible. A sharp turn which brings the skis virtually to rest is only desirable under exceptional circumstances. The sharp abrupt turn is, for instance, particularly useful in a dense wood, and is often valuable on a steep slope of difficult snow. On such a slope the skier who attempts long sweeping turns may easily find himself running out of control.

On catchy, rutty snow, moreover, it is safer to lift the inside ski, which eliminates all risk of the inside ski catching in a rut.

There are three clearly defined varieties of the lifted stem. I cannot do better than quote the admirable instructions to judges of the British Ski Tests for which Mr. Caulfeild is largely responsible.

" The object of this part of the qualifying test is to provide, for hard snow, a means of turning downhill much more sharply than is possible by the pure stem required in Q3.

The term ' lifted stem ' covers anything from a nearly pure stem-turn to a nearly pure christiania (i.e. a turn by body-swing) on the outer ski, but it is the latter form alone that produces the sharpest possible turning and that is permitted in this test.

The diagram illustrates three forms of turn.

A is virtually a pure stem-turn, done by steering with both skis weighted. The lifting round of the inner ski at the finish does not hasten the turning,

but is merely the quickest way of bringing that ski parallel for the new traverse. By this turn only a moderately sharp curve is possible.

B, commonly known as the lifted stem, is started by steering with both skis weighted (stem-turning) and completed abruptly by body-swing (christiania) on the outer ski. The second half of this turn is sharper than in A and is aided by the lifting round of the inner ski, but the stem element still predominates (which justifies the popular name).

C is essentially a christiania on the outer ski. In this case there is no true stem-turning—i.e. no

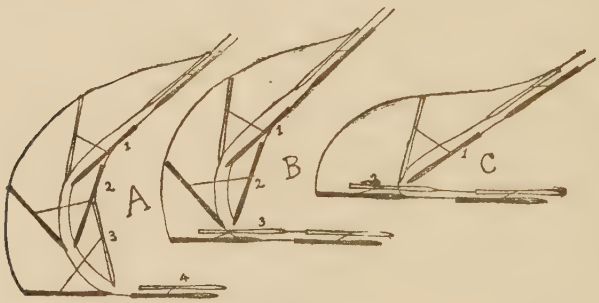

Fig. 8

steering round with both skis weighted. The outer ski is merely brought unweighted to stem position just before the turn is started and the whole weight is then shifted to it for the actual turning, which is done by body-swing while the inner ski is lifted completely round. The movement is not a steered curve but an abrupt spin and produces the sharpest possible turning. This is the type of turn required for the test."

In the diagrams the dark ski represents the weighted, the light ski the unweighted ski.

I need waste no space in giving detailed instructions for the lifted stem proper, for if the skier has

mastered the lifted stem-christiania he will, of course, have no difficulty in managing the less extreme and the less abrupt forms of this turn.

The first position is the normal position for traversing, with both knees well bent forward.

Transfer all your weight on to the lower ski and lift the upper ski, or bring the upper ski unweighted to the widest possible stemming angle (2).

Lean well forward, bending from the waist, and screw the body round inwards as far as possible. This inward and forward lean prevents the weight coming on to the outside ski, and also helps to bring

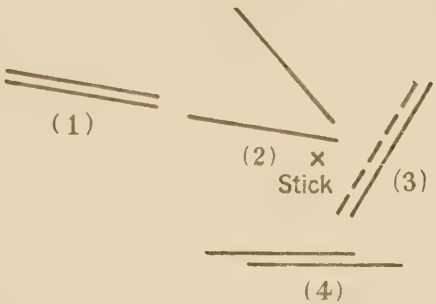

Fig. 9

the outside ski to the widest possible stemming angle. The greater the stemming angle before the turn starts the shorter will be the distance that the outside ski has to travel to reach the horizontal position which is ultimately assumed (4). Now edge the inside ski vigorously so as to get a good purchase for striking off.

Strike off strongly from the inside ski and throw the weight by a sudden decisive movement on to the outside ski. The weight should come, not on to the heel of the outer foot, but on to its toe, or perhaps better still on to the ball of the foot on the outside ski.

The outer knee should be bent well forward, and both knees should be knocked inwards.

Keeping the knee forward helps the outside ski to skid round more easily for reasons which have already been explained many times.

The outside ski will now skid round, and simultaneously the inside ski must leave the snow and must not be replaced until the turn is completed. The inside ski should then be replaced well ahead of the outside ski.

Detail. The secret of this turn is the preparatory movement. The inward screwing round of the hips should be most pronounced. Both knees should be in " forward knee " position. This greatly facilitates bringing the outer ski to the widest possible stemming angle.

As you swing on to the outer ski lean boldly down the slope and continue the screwing-round movement of the hips. The downward lean is vital. You should feel as if you were practically diving down the slope poised on the points of your ski.

Don't funk. The essence of this turn is not to hang back. Any suggestion of hanging back is fatal.

The " forward knee " position of the outer leg should be emphasized when the weight comes on to the other ski. Poking forward the outside ski and straightening the outside leg spoils the turn.

In this, as in other turns, the nervous skier refuses to believe that he can balance on one ski. He forgets that this is not a steered turn, but a swing on one ski. He refuses to hurl his weight boldly on to his outside ski, and he is so anxious to resume the security of having both feet on the snow that he allows the inside ski to come back on to the ground much too quickly.

Remember that the inward screwing-round movement of the hips is not inconsistent with getting the centre of gravity on to the outside ski, and is not inconsistent with throwing the weight boldly outward. Try balancing on one ski and you will soon discover that there is no difficulty in screwing round the body even if you are balanced on one ski alone.

It is a great help to swing the inside ski boldly forward and to replace it at least three feet ahead of the outside ski.

An excellent plan is to practise this turn on a gentle slope of hard-beaten snow and try to come to rest with your inside ski still in the air. Don't replace the inside ski until you have actually come to rest. This experiment will teach you to complete the turn by skidding round on the outside ski entirely, and will also cure you of that fatal habit of beginners of replacing the inside ski too soon.

THE LIFTED STEM-CHRISTIANIA IN SOFT SNOW

The lifted stem-christiania is the safest, sharpest and soundest method of making sharp turns on steep slopes of deep soft snow. It should not be used on gradual slopes, but on steep slopes of heavy snow it is the best method of making abrupt turns, better and more easily controlled than the step-telemark. It is a very useful turn in steep woods, or under any conditions where sharp turning is desired on steep slopes in heavy snow.

I discovered the turn accidentally at a time when the telemark was the fashionable turn for heavy snow. My physical disabilities in the shape of a stiff right toe prevent me telemarking to the right, and consequently I had to evolve for myself some

means of downhill turning other than the telemark in heavy snow.

"The lifted stem-christiania as a means of sharp downhill turning in heavy snow was, I believe," writes Mr. Caulfeild, "entirely unknown until a description of it appeared in Mr. Lunn's book." This may or may not be the case. Certainly I had seen no other skier perform this turn.

I am greatly indebted to Mr. Caulfeild for his valuable contribution to the analysis of this turn.[1]

The lifted stem-christiania in heavy snow is not easy, and is perhaps the most difficult of the turns. But it is not quite as difficult as it may appear from the following description:

In soft snow the lifted stem-christiania has three phases, a downhill step-turn followed by a jerked christiania on one foot. And between these two movements there is an intervening phase when the outside ski runs straight downhill.

On hard snow the lifted stem-christiania is virtually two movements, a preparatory movement in which the outer ski is lifted or skidded round to a wide angle, and a rapid continuous skid round once the weight is thrown at the outside ski.

In soft snow the turn is three movements, a preparatory movement similar to the corresponding movement on hard snow, a short straight run, and finally a rapid skid round of the outer ski.

The difficulty consists in holding the ski patiently for the brief moment when it is running straight downhill. The ski-runner accustomed to the feel of the continuous outward skid of the outer ski, once the weight is thrown from the inner to the outer ski, feels unhappy when this outer skid is checked, in deep

[1] Sometimes known as "the double lifted stemming turn."

THE FINISH OF A CHRISTIANIA

W. R. BRACKEN

heavy snow, by the resistance of the snow itself. In such snow the outer ski cannot be made to skid round continuously. There must be an intervening phase when the ski runs downhill a distance about equal to its own length. The secret of the turn is to realize this fact, and not to attempt to hurry the second and third phases.

The directions for the turn are very similar to the turn on hard snow. The preparatory movement is the same. The downward inward lean of the body in order to lift the outer ski to the widest possible stemming angle is the same in both turns. On hard snow the outer ski may, in soft snow it *must* be lifted, not skidded round. Less body-swing is required in the second phase in soft snow, for as the outer ski cannot at once be skidded round, it is only necessary to get all your weight *on* to it, and not necessary to start the turn by throwing your weight *at* the outer ski.

When the weight is on the outer ski, see that the weight is well on the toes and, above all, be sure not to hang back. Weighting the toes will help the outer ski to skid round. Directly the outer ski has been brought to a wide angle, weight it, lift the inner ski and swing round the inner ski in order to "reinforce to the utmost the rotary tension of the outer ski." This rotary tension, as Mr. Caulfeild explains, will ultimately cause the outer ski to swing round to the horizontal. All you have to do is to wait patiently, leaning well forward on the outer ski until this ski swings round. The short downward descent is bound to end with a skid round provided that you have patience to wait for the skid, and do not attempt to force it by leaning in.

Be careful on steep slopes to prevent the inside

ski catching. It should be lifted some considerable height and replaced well ahead of the outer ski.

(NOTE.—The prod use of the stick is very useful in both forms of the lifted stem-christiania, peculiarly so in soft snow. The stick in soft snow should be placed as far down the slope as possible and a forceful thrust against the stick will keep your weight outwards, will assist the rotary swing of the body, and will prevent an inward fall.)

A VARIATION OF THE LIFTED STEM-CHRISTIANIA

The following variation is found useful on rutted snow on which it is difficult to skid round the outside ski. It should also prove of service to skiers who, from some physical disability in one or other leg, find it difficult to control the outside ski in the lifted stem-christiania.

Instead of striking off from the inside leg and throwing all the weight on to the outside ski, begin by weighting the toe of the inside foot, then screw round the inside ski by pivoting on the ball of the foot and forcing the heel inwards. This helps to start the turn on the inside foot. Then throw your weight on to the outside ski and complete the turn as described in the text. If you find any difficulty in skidding round your outside ski to the horizontal, your inside ski may come to the ground rather sooner than in the orthodox turn. As it comes to the ground, edge it strongly and screw the heel down the slope. This tends to make the inside ski swing round parallel, the outside ski, practically unweighted, following it round.

This movement—which is virtually a christiania on the inside foot—would never be used by a skier

with normal legs, excepting on very rutted snow. On rutted snow the lifted stem-christiania can be helped out by judicious stemming on the inside ski before transferring all the weight to the outside ski. Again, on such snow the turn can be brought more sharply suddenly to a standstill if the inside ski

Fig. 10

is replaced with emphasis and strongly edged as described above.

TAIL-WAGGING

Tail-wagging is the popular term for high-radius, consecutive semi-christiania turns which are interrupted before they are completed.

The high-speed long-radius turn (Fig. 10) is easy enough provided you have half an acre or so in which

to swing to rest, but it is very difficult when you reach the point marked by a cross to interrupt your high-speed turn and reverse it. Tail-wagging consists in making high-speed turns and interrupting each turn just as it begins to curve into the hill.

Every first-class racer must master the art of tail-wagging. The quickest method of taking any slope is, of course, to run it straight, but there are slopes which no racer, however expert, can hope to take straight. It is sometimes tempting for the mediocre racer to run straight as long as he dares and then to sit down. The chief argument used in favour of no-fall racing was the fact that such intentional sitzmarks occasionally paid. But the sitzmark is a useless manœuvre against modern runners who have mastered the art of tail-wagging, which is a far safer and far quicker method of descending a slope than a combination of a straight run and an intentional fall.

Tail-wagging, again, is very useful in narrow glades where a completed turn will carry you into the trees, or on a narrow ridge where a completed turn would carry you off the ridge.

Mr. Bracken is a past master in the art of tail-wagging, and the following notes are partly based on information supplied by him.

Tail-wagging does not differ essentially from the ordinary stem-christiania. The " forward knee " is, however, even more essential for tail-wagging than in an ordinary christiania, partly in order to take the weight off the back of the ski (the " forward knee " helps to get the weight forward), and partly because this turn is virtually executed with the knees. If the knees are stiff you cannot exploit their power to the best effect. If you do not keep your knee

well over your boots the rear ends of the skis are rather liable to stick, and not to come round as fast as they should. For the same reason the crouch position must be exaggerated, and the dip movement must be even more pronounced than the rise. You sink into a low crouch, but you need not necessarily straighten up to a pronounced erect position.

To start the turn to the right, say, look over your left shoulder, stem slightly with the left ski, get both knees well forward, then swing your shoulders and your head rapidly round until you are looking over your right ski. Don't let the right (inside) ski lag behind.

Try to keep both skis and both knees as close together as possible throughout this movement. When the skis come round exaggerate the "forward knee" position in order to prevent any of the weight coming back on to the heel, which would tend to drive the skis too far round into the slope.

When turning at high speed the weight is pretty evenly distributed at the end of this movement.

The last stage of the stem-christiania proper, when the weight comes on to the heels, is omitted. It is essential to check the rotation of the skis before the turn is completed, and for this reason it is most important to keep the knees well forward in order to prevent any of the weight coming back on to the heels.

The turn to the left must follow at once directly the turn to the right has been interrupted. This is carried through by the same method.

The best exponents of this turn keep their knees and skis very close together throughout.

To practise, select a well-beaten slope and when

you can tail-wag on hard snow repeat the manœuvre on soft snow.

Remember that the object of tail-wagging is not to stop or even to change direction, but to take off speed.

CHAPTER XII

THE JUMP-TURN

THE jump-turn is mainly useful in breakable crust, but is also valuable on badly rutted snow on which skidding is difficult, and on any occasion calling for a very sharp abrupt turn.

PRELIMINARY EXERCISE

Choose a level spot and discard your sticks. Stand with both skis together. Crouch down and then immediately straighten up and jump round through an angle of 90°.

Try to unroll from the heels rather than jump from the toes. Repeat this exercise, both to the right and left, until you can do it easily and rhythmically, and until you can keep your skis absolutely parallel throughout the turn and your knees rigidly together.

Now attempt a complete jump round from a standstill. You will need your sticks for this exercise. If you want to jump right round to the right, you should place the point of your right stick close to the rear end of your right ski, and the point of the left stick close to the upturn of the left ski.

Crouch, and then as you straighten up put your weight on to both sticks and jump round through an angle of 180° so that you finish pointing in exactly

the opposite direction. When you have mastered this to the right, repeat it to the left, and continue until you can do it easily and rhythmically.

JUMP-TURN FROM A DIRECT DESCENT

The technique of a jump-turn from a direct descent is exactly the same as the technique of a jump-turn from a traverse, and it is therefore unnecesssary to describe the latter manœuvre. The beginner should not, however, attempt to turn through an angle of 90° (from a direct descent) until he can make small changes of direction of, say, 15°, when jumping into the hill from a traverse.

As a preliminary exercise select a gentle slope and run across it at a low speed and then try and change direction by means of a jump-turn into the hill through a small angle, employing for this purpose the instructions given below, which are equally valid for jumps through an angle of 15° as for jumps through an angle of 90°.

The jump-turn is the result of three movements, first the crouch, second placing the stick in the snow, and third the jump itself.

The amount of the crouch should, of course, vary with the intended vigour of your jump. For small changes of direction it is not necessary to crouch very low.

The beginner, however, would be well advised to make a pronounced crouch from the first, which he can later modify to suit different conditions. Most novices think they are crouching very low when, as a matter of fact, they are merely slightly bent. The beginner should, therefore, test his crouch as follows :

A JUMP-TURN BY W. AMSTUTZ
(NOTE KNEES TOGETHER AND SKIS PARALLEL)

1. He should hold the left stick (if he is jumping to the right) horizontally. He should then crouch down until he can touch his left ankle with his left hand. Keep your skis together as you crouch.

2. Directly you have assumed your crouch, bring forward your right stick (I am giving directions for a jump-turn to the right) and place the point in the snow well ahead, near the upturn of the right ski. Put the point of the stick into the snow as near the point of the ski as possible. If the ski point is some distance to the side of the stick, you will get very little value out of the stick.

It is quite unnecessary and indeed undesirable to change your grip on the stick. The ordinary grip which you use in running should be retained.

Directly the point of stick touches the snow, straighten up with an easy rhythmic swing. The resistance of the stick is communicated along your arm to your body and helps to drive you upwards. If the timing of these movements is correct, and if your upward spring coincides with the moment when your arm stiffens against the stick, the actual jump itself will involve little effort.

But the jump is a jump round as well as a jump up. It is quite unnecessary, at any rate in an uphill jump from a traverse, to wrench your whole body round. The skis should be brought round by a twist of the lower part of your body below the waist, and the shoulder should remain almost square with the original direction of the ski.

This trick of twisting round the lower part of your body is very valuable, for it prevents unnecessary effort, and, curiously enough, seems to make the turning much easier than if you try to turn your whole body.

Detail. The commonest mistake in the jump-turn is to take off unevenly from one foot, instead of simultaneously from both feet. A jump-turn on skis differs radically from a high jump on foot. In the latter, the jumper takes off from the ball of the leading foot, but in a jump-turn on skis the jumper takes off from both feet simultaneously, from the heels rather than the toes. Of course, the heels are lifted just before the jump-turn takes place, but the longer they remain on the skis the better. The beginner must aim less at a spring than at a rhythmical unfolding of the whole body. The secret of the jump-turn is much the same as the secret of a successful " sats " when preparing for a jump on a jumping hill. In other words, the actual jump is less a spring than a rhythmical unfolding and straightening of the body from a crouch position.

It is a mistake to bend down some yards before you intend to jump. Beginners sometimes travel several yards in a crouch position before straightening up with a jerky movement. You miss the rhythm unless you time both the crouch and the spring correctly. The whole movement is done in quick one, two, three time. The beginner is advised to count, *One :* Sink downwards. *Two :* Place the stick in the snow. *Three :* Jump.

When you crouch, make sure that you do crouch, and that you are not merely bending forward from the hips while your knees remain quite straight. The " forward knee " position is as important in this as in any other form of crouch. Jump off both feet simultaneously. This is most important, as already explained. There is always a tendency to take off from one foot rather than from two. This can be corrected by continuing to practise until you

have mastered the jump-turn with the knees rigidly in contact throughout.

In landing avoid stiff knees. When you land, you should sink gracefully on to your heels, and you should land with the top foot on a traverse slightly ahead. When landing from a high-speed jump-turn sink on to your heels until your hands almost touch the snow to avoid the nasty forward pitch which is the result of landing stiffly on the toes. It is not a bad plan to land in telemark position from a particularly vigorous jump-turn.

A JUMP-TURN TO CONNECT TRAVERSES

The downhill jump-turn to connect traverses is really two distinct manœuvres, according as to whether the jump is done at speed on a gradual slope or comparatively slowly on a very steep slope.

A downhill jump-turn at a fair speed on a gradual slope is not very different in principle to an uphill jump-turn from a direct descent. The skis have to be forced round through a wider angle, and more care has to be taken in correctly placing and using the stick. Everything that has been said about crouching low, jumping from the heels rather than from the toes, rhythmically unfolding the body and sinking down on landing, holds good.

The stick must not be put too far down the slope, especially on a steep slope, for the stick will then sink in deeply on receiving the ski-runner's weight ; and if the stick gives way at the moment that it should provide a firm resistance, the ski-runner's balance is likely to be upset. Broad discs will counteract this tendency to some extent, but not altogether.

On certain types of crust a broad disc slips over the surface if the stick is put in so that the line of the stick slants downhill. As pressure comes on to the stick, the stick is then forced slantingwise down the slope and skids an inch or two before finding proper purchase, an irritating and perplexing movement. This can be checked by insuring that the stick is placed in the snow so that the stick is vertical, and the pressure vertical. It is a good plan to crouch very low and then stretch out your arm to its utmost, as if you wished to place the stick in the snow pointing inwards to your body rather than outwards down the slope. This will effectively prevent the stick sliding down the slope when the pressure comes on to the stick.

A downhill jump-turn at slow speed on a really steep slope requires a different method. The main difference lies in the fact that the upward spring is omitted altogether. Crouch as low as you can, place your stick in the snow as described, and then screw your body, shoulders and hips as far round as you possibly can. You should feel a real sense of tension in your heels as if they were only with difficulty prevented from following your hips and knees. Now lift your heels and bend forward on your toes. At the precise moment when you feel that you are toppling forward over your toes you can give a little jump and, so to speak, fall round. The whole secret of the jump round on a steep slope is really to fall round rather than actually to jump round. Try to imagine that you want to dive head first down the slope, that you are anxious to topple over your toes. Get your head really low and well forward over the toes before you begin to think of the jump round. This topple round—for it is really not a jump at all—

THE DOUBLE-STICK JUMP-TURN

is extremely easy on steep slopes once the novice has overcome his innate horror of getting forward and his instinctive tendency to hang back. The take-off should be definitely from the toes, as this helps to get the heels clear of the slope.

A useful trick is the downhill jump-turn from a standstill. In this case the point of the upper stick should be rested in the snow just above the upturn of the upper ski, and the point of the lower stick should be rested in the snow just below the heel end of the lower ski. This is to prevent them getting in the way of the skis during the jump. Get your weight on both sticks as you jump and thereby save effort.

THE HALF-JUMP-TURN

This is a useful manœuvre on rutted snow. The best method of descending snow covered by hard ruts is to run at as steep a traverse as conditions permit, and then to check your speed by means of a half-jump. Instead of trying to lift your skis clear of the snow, jump just enough to lift the *heels* of your skis clear. This jump movement will enable the heel ends of your skis to clear the ruts, especially if you make a point not only of lifting the heels clear of the ruts, but of jerking your feet down the slope as the jump finishes. This helps the heel ends of the skis to skid over the top of the ruts and to skid downwards as the weight comes on to the heels after the half-jump is completed.

This half-jump is merely a form of the pure christiania. Its value is very marked on rutted snow in which the usual form of pure christiania is more difficult as the skis tend to catch in the ruts, thus causing a fall.

THE DOUBLE-STICK JUMP-TURN

If you are carrying a heavy load or feeling tired you should place *both* sticks on the side towards which you intend to jump. The technique of the double-stick jump-turn does not otherwise differ from that of the normal jump-turn. Ladies will find this method much less fatiguing than the ordinary method.

CHAPTER XIII

STICK-RIDING

THE term "stick-riding" is mostly used by British runners to include not only stick-riding proper, i.e. bestriding the stick much as the witch bestrides the broomstick, but also what might be more properly described as stick-dragging, putting both sticks together and using them as a brake.

The British were the first definitely to forbid stick-riding in their racing rules. There are, of course, circumstances which justify stick-riding. We allow stick-riding in roped races, and in that form of race known as the cross-country race (which differs both from the ordinary downhill race and the langlauf), but in the main both our races and our tests are based on the belief that our skiers should be encouraged to cultivate a stickless style and should regard stick-riding as an emergency measure for exceptional cases.

Our policy may be justified on the following grounds:

1. Stick-riding under normal circumstances involves an unnecessary expenditure of force. Free ski-ing is normally less tiring than stick-riding. It is less exhausting to take a slope straight or to put in a few free turns than to ride on your sticks.

2. The habit of stick-riding is fatal to the cultivation of speed. A stick-rider is always tempted to use his sticks. The stickless ski-runner once he has launched himself down a straight run must either fall or stand. He cannot brake with his sticks, and consequently, instead of attempting to reduce his speed, he concentrates all his efforts on retaining his balance at high speed.

Stick-riding, like cocaine, is useful in an emergency, but devastating as a staple diet.

Even if the whole object of ski-ing was to go from one point to another as quickly as possible, the veto on stick-riding in our tests and races might still be justified on the ground that the man who is taught the stickless style will normally get from one point to another more rapidly than the man who relies on his sticks to reduce speed and to control direction.

3. The modern bamboo sticks are not made for stick-riding. They break if you put too much weight on them. The discs at the end of the sticks are apt to catch in the snow and produce an uneven, intermittent jerky movement. The technique of stick-riding virtually demands a stout long pole without a disc.

Those of us who skied in the old days with such poles remember the long labour of the ascent. The skier provided with the modern bamboo sticks can get away from the single-pole skier not only on the descent, but even more easily on the climb. Modern sticks demand a mastery of the free stickless style which make for fast ski-ing both uphill, downhill and along the level. Even on the most severely practical grounds stick-riding should therefore be discouraged.

But even if stick-riding made for increased speed and steadiness, stick-riding would still be condemned for the good reason that it is such remarkably poor fun.

After all, ski-ing is not purely utilitarian in its object. We do not use ski merely to get from one place to another in the shortest possible time. The Davos skier does not cross the Parsenn-Furka on ski merely because he wants to get to Küblis. He will get there much quicker in the train. We ski for enjoyment, and consequently anything which contributes to our enjoyment in ski-ing is its own justification. We who rode our sticks in the old days only began to realize the real joys of ski-ing when we learned the stickless style, and none of them who took the trouble to learn stickless technique ever reverted to their old bad habits. This is decisive. Those who advocate stick-riding must produce at least one master of the stickless style who has been converted to their school. No such skier exists.

Finally, stick-riding is ugly and free ski-ing graceful. This, the æsthetic consideration, is not altogether unimportant.

The cultivation of stick-free style can then be justified on three grounds ; it conduces to pleasure ; it conduces to fast ski-ing ; it conduces to beautiful ski-ing.

I have heard Norwegians maintain that a race should be decided by time alone with no artificial restrictions about the use of the sticks. And yet, no Norwegian would be prepared to advocate a jumping competition to be decided on length alone. The veto on the stick in downhill races is far easier to justify than style marking in jumping.

WHEN STICK-RIDING IS JUSTIFIABLE

The first-class skier must, however, master the technique of stick-riding, as there are occasions when stick-riding is sound.

When speed is a matter of vital importance, i.e. racing against storm or the oncoming night among the mountains, stick-riding may be useful on difficult snow ; for it is usually quicker to run a slope straight with the help of the sticks than to turn, especially if the turn is a jump-turn rendered necessary by breakable crust. A tired party at the end of a long day on difficult snow will also find stick-riding restful.

On such snow there is a great output of muscular energy in the legs, upon which falls the main work of counteracting changes of speed, i.e. when running from fast into slow snow or vice versa. If you have your sticks handy for braking, even if you are not actually braking, the mere fact that you have this third point of support in reserve, and that a momentary loss of balance will merely bring the weight back on to the sticks, lessens the strain on your legs. You expend much less leg-energy in preserving your balance, conscious as you are of the fact that your arms are there to help out your legs if necessary.

A stick-rider can tear down every variety of difficult snow and vile crust, and turn up fresh at the bottom, what time the stick-free skier is exhausting himself with jump-turns and holding up his party by frequent tacks and traverses.

On a short tour it is usually best to utilize difficult crust as an exercise in stickless technique, but on a long tour stick technique has its value in really vile snow.

THE TECHNIQUE OF STICK-RIDING

Stick-riding proper consists of putting either a single pole, or your two sticks held together, between your legs. Stick-dragging is the correct term for putting your two sticks to the right or to the left and using them as a brake.

Stick-dragging is safer but rather more difficult than stick-riding, for the drag on the sticks tends to pull the skier to one side. It is therefore difficult for the stick-dragger to run straight. On the other hand, stick-riding is dangerous at high speed, as it is extremely easy at high speed to trip over the sticks and damage oneself.

It is essential to remember that the sticks may be used as a brake, but are never intended as permanent support for the balance. You may momentarily fall back upon the sticks as the third point of support, but to run in this position is most unsound.

Ask yourself whether you would be bound to fall if the stick suddenly broke. If the answer is " Yes," your position is wrong. In other words, even when you are using your sticks as brakes, your centre of gravity should be above your feet, not behind them.

Most of the fundamental principles of straight running apply equally even if you are braking with your sticks.

It is equally important, for instance, to keep your knees well forward when stick-dragging, as in free straight running.

Assume that you are holding your sticks on your right side. As the pace increases you should adopt an extreme crouch, bend your knees well forward and keep your left hand well forward. If you brake, do not merely throw your weight on to the

sticks, but push down with your right hand and pull backward slightly with your left hand. This backward pull is quite as effective for braking as the downward thrust.

Be very careful not to let the left hand be dragged back across the body. If you allow your left hand to come back you will end by resting most of the weight of your body on the sticks, a thoroughly unsound position, not only because it is intensely tiring, but also because it is extremely likely to lead to a backward fall. Keep your left hand stretched out and well forward. Don't let your right hand fall much behind the level of your right foot.

If the sticks are properly used, they will not only reduce speed when braking is necessary, but they are also a protection against falls both in the fore-and-aft direction. If your skis strike a patch of sticky snow, your body comes forward, but it will come forward far less rapidly if you are holding your sticks correctly ; for the sudden forward movement of the body drives the sticks into the snow, and the resistance of the snow in turn checks the forward movement of the body.

The following method should only be adopted for very steep slopes :

Point your right ski straight down the slope. Bend your right knee forward and crouch as low as you possibly can, your two sticks being on your right side. Bring your left ski to as wide a stemming angle as possible. The position thus assumed is not, of course, the double stemming position, for the right ski is pointing straight down the slope. It is, in fact, a half-stem.

A combination of stick-dragging and this wide half-stem produces a powerful braking action.

The difficulty in this manœuvre is to prevent the skis swinging round towards the right. You can correct this by resolutely keeping the right ski pointed down the slope or even a few degrees to the left of the straight line, if your ski shows a tendency to veer to the right.

THE USE OF THE STICK IN TURNING

The drag use of the sticks is of less help in turning, but is often useful to help out a stop-turn. The stick-christiania, for instance, is a valuable manœuvre for emergencies.

On hard, smooth skidding snow the christiania without sticks is so easy that the use of the sticks is only of value if, for any reason, it is important to arrest the side-slip after the turn is completed. The stick-christiania, of course, pulls the skier up far more abruptly than a stickless turn. Usually a skidding side-slip once the turn is completed is a great advantage, as it carries the skier further down the slope and saves time. If, however, there is any urgent need for a sudden stop, such as a crevasse or a fence or a fallen body in the skier's path, the man who has mastered the stick-christiania and who has the presence of mind promptly to put his sticks together will stop far more abruptly than the stickless skier.

The chief use of the stick-christiania is as an emergency turn on snow which does not permit free side-slips, i.e. very heavy snow, or snow with a suspicion of breakable crust on the surface.

In soft breakable crust the telemark is easier than the christiania, as it is much easier to start a telemark than a christiania in such snow. But both

turns are equally difficult in their last phase. If the skier leans in too soon he will inevitably fall inwards. If he does not lean in at the end of the turn (I am referring exclusively to the turn in breakable crust), he will be thrown violently outwards. It is best to wait until the turn is practically completed and then to jerk the shoulders round rapidly. The correct timing of this shoulder movement is extremely difficult, and consequently an outward fall is the normal result of attempting a high-speed stop-turn in such snow.

The difficulty largely disappears if you use your sticks. You can initiate the inward lean at a far earlier stage of the turn, as the sticks will save you from the inward fall which would otherwise result. You can lean in far more vigorously at the end of the turn for the same reason. Also, the drag use of the sticks helps the skis to turn, for a great deal of the weight is taken off the skis on to the sticks, and an unweighted ski turns more easily and cuts less deeply into the crust. Indeed, the stick-christiania is an easier, safer turn on soft breakable crust than the telemark, though a stickless telemark in such snow is easier than the stickless christiania. The stick-christiania, again, can be done at far higher speeds than the jump-turns.

The sticks are of no use whatever for starting a downhill turn. Indeed, the man who hangs back on his sticks will only achieve a long laborious spun-out turn.

The stem and stem-christiania turns should be started in exactly the same fashion and manner whether you propose to use your sticks or not. The sticks are of no use to *start* the turn, but may be applied to help out the finish of the turn on very

difficult snow, especially if a short, abrupt turn is desired.

In conclusion, I should like to emphasize the fact that the use of the sticks described above should be reserved for rare emergencies. On short expeditions you should welcome the opportunity which difficult snow will provide to improving your stick-free technique. The man who has, say, passed the Second Class Test may devote a little time to mastering stick technique, but once he has mastered it, he should make up his mind never to use the sticks on short tours excepting on narrow icy paths, and not to stick-ride even on longer tours unless the snow is exceptionally difficult, and unless he himself is feeling particularly tired.

CHAPTER XIV

SKI-LAUFING

BY "ski-laufing" I mean the technique of moving as easily and as rapidly as possible along the level or uphill.

In this book I am concerned primarily with the technique of ski-running, but even the most ardent member of the Downhill Only Club of Wengen must occasionally point his skis uphill, and some knowledge of ski-laufing technique is important even for those who do most of their climbing in funiculars.

Most English skiers regard the climb as a mere means to an end, and level ski-ing frankly as a bore. It is my habit at Mürren to ski-lauf back from Shrub Slope to the hotel, a distance of about a mile along a level, undulating path. I seldom find a companion, as the average Mürrenite prefers to hang about for twenty minutes waiting for a train at Halfway House rather than to ski-lauf back along the path. And because ski-laufing is voted a bore, the average skier cuts a very poor figure along the level or uphill. No rhythm, no ease of movement, no attempt to exploit the resources of his sticks.

This chapter is written, not for skiers with langlauf racing ambitions, but for the rank and file of ski-runners. Even the most elementary knowledge of ski-laufing technique will add enormously to the interest of a day's run among the hills. To the

ski-laufer the climb presents fascinating problems of technique. The interest in the day's ski-ing is therefore not confined to the comparatively small portion which he spends sliding downhill.

I do not propose to describe in great detail the various ski-laufing steps. There is not the least difficulty in learning the steps themselves. Anybody can pick them up in a few minutes. The difficulty about ski-laufing is to time the movements of the stick, and to acquire an easy, effortless rhythm which co-ordinates the separate movements into one fluent whole.

The sticks themselves can either be swung forward alternately or thrown simultaneously forward. The first of these two methods is the more usual.

Whichever method you adopt the first thing you must learn is to keep your elbows in. If you watch a stray group of British skiers wending their way along the level, you will see a vast amount of daylight between their elbows and their bodies. Their arms are never straight. Their arms are always bent, and their elbows are always well out. They drop their sticks casually into the snow about a foot in front of their feet and about eighteen inches to the side of their skis. They give a mild thrust and then out come their sticks again. They use their sticks not to propel themselves along, but as props. Now the sticks are not intended to prevent the skier from toppling sideways, but to propel the skier along. Consequently, the stick should be put into the snow as far forward as possible, and as near the ski as possible, a few inches behind the point of the ski and only two or three inches at the utmost from the side of the ski.

Directly the stick is placed in the snow, the elbows should remain as close as possible to your sides. Hand and elbow should move backward in the same plane. The beginner's hand is always moving to and fro in quite a different plane to his elbow.

I have been describing the normal ski-laufing step. The left ski goes forward, the left shoulder goes forward, and simultaneously the left stick is placed in the snow well ahead. As the stick is placed in the snow, the left arm should be stretched and straight. Your weight should come on to the stick, and the backward thrust should continue until you see the point of your right ski sliding ahead. Little is gained from overdoing the backward thrust, for if you continue it too long lateral stability will be slightly endangered, with the result of a slight wobble which spells waste of energy.

The other method of using your sticks is to swing them forward simultaneously, taking two or three steps for every forward swing of the sticks.

The body is bent forward to the utmost, the full weight comes on to both the sticks simultaneously, and the backward thrust is continued longer than in the method described above. The backward thrust is prolonged by bending well forward and crouching so as to keep the sticks in the snow as long as possible.

In bringing forward the sticks again, don't lift them more than you can help. Bring them round to the front by a semicircular movement, keeping your hands as low as possible.

These are, broadly speaking, the two main modes of using the stick, the alternate method and the simultaneous method. Both have their advantages, and the good ski-laufer varies his methods, sometimes adopting one, and sometimes the other.

You should exploit every little chance undulation on a comparatively level track. A well-timed vigorous thrust of both sticks just at the moment when you are pointing the skis down a small descent will often send you some yards up the corresponding ascent on the other side. The great Norwegian langlaüfers are past masters in utilizing to the utmost the resources of the ground.

A good ski-laufer, again, never lifts his ski unless he must. He slides, and he holds on to the slide until the skis lose their momentum. It is, of course, much easier to slide along the level than uphill. As the gradient increases, the temptation to lift increases, but you should resist this temptation as long as possible.

With a little practice you will find yourself sliding up gradients on which you had only been able to advance by lifting the ski at each stride.

You will find if you do this you will go up a slope far easier without skins, while your less skilful friends are making heavy weather even with skins.

Don't put your sticks in the snow in such a position that the stick is vertical when your weight comes on to it, for in this case you will push yourself *upwards* rather than *forwards*. The upward pressure on a vertical stick merely lessens your grip on the slope, and tends, as Mr. d'Egville has pointed out, to lessen the friction between your ski and the slope, thus increasing back-sliding tendencies.

Get your hand well forward as the stick goes into the snow, and see that the stick is placed into the snow just behind your feet. The stick will then form an angle of about 45° to the slope, and as your weight comes on to it the stick will help to propel you forwards, not upwards.

The sticks should be placed in the snow with the arms straightened out and stretched well forward. "The stick used with bent arms," to quote Mr. d'Egville's pregnant phrase, "is merely a support, not a propeller."

The steeper the slope the more you should bend the body forward. A stiff upright body is a great handicap.

Bend forward and slide your skis instead of lifting them. Straighten your arms as the sticks go forward, and place your sticks in as near the skis as possible.

Such are the fundamental principles of ski-laufing. The rest—a long "rest"—is experience.

CHAPTER XV

HINTS ON RACING

EQUIPMENT

I HAVE little to say on this subject beyond what I have already said in the chapter on "Equipment." The skier of the future will, I fear, have to travel to important competitions with four different types of skis, jumping, langlauf, steel-edged skis for slaloms, and broad heavy skis for straight racing. It is foolish for the jumper or the langlaüfer to mock at steel edges for slalom skis, unless they themselves are prepared to abandon their own specialized skis to jump, or to langlauf on touring skis.

BINDINGS

I am a great believer in insuring against accidents by using two bindings for all important races. I have seen so many races lost by a binding breaking or by an Erkisen clamp coming undone, that I always recommend racers to use a B.B.B. plus any other binding they may happen to prefer, such as the Alpina, Huitfeldt or Lapp. If anything goes wrong with your heel strap the B.B.B. will carry you home, and you need not waste any time repairing, refitting or retightening the peccant heel-strap.

Those who use the Lapp binding should put in a new binding about a week before any important

race. I once saw a first-class runner break a Lapp binding a minute before he was due to start for the Arlberg-Kandahar slalom. He was exhausted by the effort of replacing the binding in the short time at his disposal. Moreover, a new Lapp binding is apt to stretch during the first few days, so that it is most important to use a new Lapp before an important event, and it should be put on about a week before the race in question.

WAXING

The question of waxing skis for downhill races presents many difficulties. On a very steep course such as the classic Roberts of Kandahar course slow skis may be an advantage, but it must always be remembered that turning is more difficult on slow than on fast skis. Of course, if stick-riding is permitted, and stick-riding is permitted in roped races for instance, skis cannot be too fast, as an expert stick-rider can slow down the pace on steep slopes by the use of his sticks, and can let his fast skis have their head on more gradual slopes.

GLOVES AND HATS

Gloves should, if possible, be dispensed with in racing. If you must use gloves, use gloves with five fingers, not the usual type of mit. Stick-control is very difficult if you use big, clumsy mits. Many a racer has dropped his sticks because they slid through gloves too big and too clumsy to keep control of them.

A close-fitting helmet type of hat is much better than a hat or a cap with a peak, as such caps or hats

are liable to be blown off, and such an accident to one's hat is apt to upset one's balance.

TRAINING

Few things are more difficult than to train in a Swiss hotel, but those with the strength of mind to train in spite of difficulties will score. No skier, of course, would dream of entering for a langlauf unless he was in good training, but few realize that even a slalom, the shortest of all races, is a severe test of condition and of morale. Self-control and exact calculation are the secrets of good slalom racing. In a straight race you make a bad mistake and recover, but in a slalom a bad mistake is usually fatal. A slalom is, therefore, a test of nerve, and nerves depend on training. The slalom races of the future will be won by men in strict training, who have given up tobacco and drink some weeks before the event.

Slalom and straight racing are not, of course, such a strain on the heart as langlauf racing, but continuous downhill running at high speed is very hard on the leg muscles and also on the nerves. If you come straight out from England and try to run continuously 1000 feet of fast running, your legs will almost certainly pack up under you unless you have trained in England. Fortunately, there are exercises that can be done in England which strengthen the muscles used in downhill races. We are gradually beginning to realize that it is impossible to get fit and to get these muscles into perfect training within a short winter holiday, and the keen racers accordingly arrive in Switzerland already trained.

Flight-Lieutenant H. R. D. Waghorn, winner of

the Schneider Cup and one of the best British ski racers, has evolved a series of exercises which, he claims, develop the muscles used for ski racing and enable him to start the winter season in thoroughly good trim. These exercises are as follows :

1. Stand on a chair near the edge, go down on one leg until the knee touches the chest. The other leg is kept straight and clear of the ground. Half a dozen bends of this description a day is as much as you will feel inclined to attempt for some considerable time. Many skiers find that they are stronger on one leg than the other, and this exercise soon finds out the weak one.

2. Standing, feet six inches apart, with heels flat on the ground, bend down until the knees touch the chest. The arms should be held straight and point forwards and downwards. This exercise should be continuous and there should be no check either at the top or the bottom.

3. Standing with *heels flat* on the ground and one foot twelve inches in front, bend down until the knee touches the chest ; spring from this position into a similar one with the other foot leading, and continue this without pausing or checking ; the arms should be held straight and point forwards and downwards. Care should be taken to keep this exercise springy and to keep the heels flat.

The important thing to remember in these exercises is to keep the heels flat on the ground, and not to do them on the toes. This point, so far as I know, has never yet been emphasized excepting by Flight-Lieutenant Waghorn. These exercises bring into play almost all the muscles used in ski-ing. If the heels are not kept flat, some of the principal ski-ing muscles are not exercised.

PRACTISING OVER THE COURSE

The courses for all important races are advertised some days, at least, before the event takes place. The course for the Arlberg-Kandahar race, for instance, is the same from year to year. The object of announcing the course beforehand is to eliminate so far as possible the advantage of local knowledge and to give competitors from other centres an opportunity of going over the course.

A fair proportion of most race-courses will consist of ground which presents no particular problem, and which can only be taken in one way. On other sections there will be a considerable choice of line, and the possibilities of straight running as against turning will have to be carefully considered. You should concentrate all your attention on those sections. The wise man will make a point of repeating the difficult sections two or even three times on each occasion that he runs down the course. This means, of course, climbing back again in the middle of the run down, which is rather tiresome but is well worth while.

The fact that you stood down a difficult line three times in succession during your practice runs will give you a world of confidence on the day of the race.

RACING TACTICS

Keep warm before the race starts. You should start the race with your muscles tuned up. If you are cold, rapid co-ordination of muscle and mind will be rendered more difficult, because the messages from the brain take longer to travel along the nerves.

In a long downhill race, if the first few slopes are gentle, it matters less starting cold, for on those first few slopes you will " tune up." A slalom is a short race, and you cannot afford to devote the first part of it to " tuning up."

Consequently, do not stand about at the top of the slalom. If you have drawn a late number, take up a position about half-way down the slope, which has the additional advantage of enabling you to draw useful deductions from the tactics of your predecessors. As your turn approaches walk up the slope, take the last fifty feet or so at a rush, timing your arrival at the starting-point for about a minute before you actually have to go off.

HOW TO DEAL WITH SPECTATORS

In minor races it is often difficult or impossible to keep non-racers off the course. I am indebted to my son Peter, an experienced and ardent ski-racer, for the following advice on the correct technique for dealing with casual skiers let loose on the course.

The moment he sees a casual skier on the course he gives a piercing shriek and makes a bee-line for the skier in question. This is not quite so brutal as it sounds. The skier hears his yell and at once starts shifting. If the racer tries to decide on the skier's probable line of flight, he will probably guess wrong and collide with him. One thing, however, is certain. The skier will not be on the precise spot where he first heard the racer's shriek of rage, and consequently if the racer aims at that precise spot he is certain to avoid a collision.

"STEPPING OUT" (p. 161)

C. E. W. MACKINTOSH IN THE ANGLO-SWISS RACE

TOE-SPIN AND OTHER MATTERS

Toe-spin wrecks more slaloms than any other cause. The aspirant to slalom honours must spend several afternoons on practice slaloms, giving his entire attention on getting his inside ski well ahead. He will do no good in slalom races until it is second nature with him to keep the inside ski ahead, thus eliminating all risk of toe-spins.

In first-class slaloms, victory depends on a mastery of the " stepping out " trick. Nobody is going to win a first-class slalom if he is content to complete his turns. He has got to step out of one turn when it is half-way round and step into another downhill turn on a new tack.

When two turns follow in sharp succession through three pairs of flags, the finished slalom expert generally skates round on his inside ski, the outside ski coming off the ground just before the inside ski points downhill. This stepping round is virtually a jerked christiania on the inside ski, the outside ski being lifted round unweighted. Mackintosh is a master of this manœuvre.

ROPED SKI-ING

Roped racing is very good fun. I have described elsewhere[1] the peculiar joys and sorrows of roped racing, and I should like to emphasize once again the fact that roped racing is the best possible training for glacier ski-ing. The technique of roped racing certainly differs from the technique of roped ski-ing on the glaciers. Speed is the primary consideration in racing, safety among the mountains. None the less, I have gained confidence in roped racing which

[1] See *A History of Ski-ing*, p. 295.

has been invaluable among the mountains. I learnt more about ski-ing on a rope while practising for the Scaramanga Challenge Cup than in many seasons of ski-mountaineering. When I returned to the glaciers I discovered that I was not only faster on the rope, but that I was steadier ; in brief, a better mountaineer.

The unpractised roped ski-runner is so taken up with his own troubles that he is ill-prepared to cope with any emergency. Roped racing is a succession of emergencies, and the man who has learned to keep his head whatever tricks may be played by the rope or by his partner, the man who has learned to hurl himself on to the ground at a moment's notice if his partner falls in a roped race, will probably have no difficulty in performing a similar manœuvre if the leader breaks through into a concealed crevasse. Roped ski-ing on a glacier is at least three times as slow as roped racing, and if a man can keep his distance and not overrun his partner when travelling at high speed in a race, he will have a wide margin for emergencies among the glaciers, where the pace must, of necessity, be kept down to reasonable limits.

As to speed, Mr. C. E. W. Mackintosh and the present writer won the Scaramanga Challenge Cup, on an aggregate vertical descent of 1500 feet, in 3 minutes 31 seconds, and in 1930 Viscount Knebworth and Miss Sale-Barker only missed equalling this by three seconds. Lord Knebworth, by the way, on that occasion described the sensation of being roped to Miss Sale-Barker to " ski-kjöring behind an aeroplane."

Stick-riding and stick-dragging are permitted in roped races, and the mastery of the technique of the stick is of the greatest importance for roped ski-ing.

The two skiers on the rope must either run side by side, the method usually adopted and maintained as long as possible, or one behind the other. In both cases it is important to avoid downhill turns and take the slopes as straight as possible. Of course, downhill turns are quite practicable on the rope, and a slalom section used to be included, and should, I think, again be included, in the Scaramanga Roped Race. But on ordinary slopes turns are a waste of time, and the pace should be kept down by stick-dragging. It is much easier for two skiers racing side by side to keep exactly in line if they understand braking with the stick. Braking with the stick is more reliable and less tiring than double stemming.

The rope should be left to look after itself. Experience has conclusively shown that for one skier to remain behind and carry a coil of rope in his hand is a mistake.

Experience has shown that it is better for the man who skis behind to attempt to follow the movements of the man in front by sight rather than to attempt to interpret verbal instructions, "Left turn, right turn," etc., which are liable to be misunderstood in the excitement of the race.

The disadvantage of running in line, one man right behind the other, is that the rear man unless he is careful is liable to run across the rope and become entangled. This risk is reduced if the two skiers race side by side trailing the rope behind them.

CHAPTER XVI

THE RELATION OF SKI-RACING TO SKI-RUNNING

SKI-RACING may be discussed—

(*a*) On its merits as a sport.
(*b*) As a school for cross-country ski-ing.
(*c*) As a test of cross-country ski-ing.

Ski-racing as a sport is not the theme of this chapter, though in the interests of clear thinking it is well to insist that even if ski-racing could be proved to lower the standard of cross-country ski-ing, ski-racing as a sport would be unaffected by this irrelevant consideration. Of course, if cross-country ski-ing were a civic duty or religious rite, the influence of ski-racing on cross-country ski-ing would be a problem of great moment. But this is not the case, and there is therefore no reason why the sport of cross-country ski-ing should take precedence of the sport of ski-racing, or why the latter sport should be expected to justify its existence by proving that it exercises a beneficent effect on the former. The 'Varsity boat race would not be discontinued even if it could be shown to exercise a disastrous effect on long-distance boating.

The aspects of ski-racing which will be discussed in the following pages are of secondary rather than of primary importance, but are none the less of great interest to those who are equally attracted by two

great sports, ski-racing and cross-country ski-ing, and who are therefore concerned to discover which forms of racing are most calculated to improve their cross-country ski-ing.

I therefore propose to discuss how far the various forms of races serve as a good school for and as a good test of ski-running.

A race is a good *school* for ski-running if the experience gained in racing proves of value in cross-country ski-running. It is a good *test* of ski-running if those who are considered the best ski-runners normally beat those who are considered less good.

A race may of course be a good school and not a good test. For instance, no-fall racing is a good *school* because it teaches control, but it is a bad *test* because its results are too capricious and the proportion of good ski-runners who are disqualified tends to be too high.

SKI-RUNNING. SKI-LAUFING. SKI-JUMPING

Before we can discuss the relation of racing to ski-running we must begin by deciding what constitutes first-class ski-running.

And what precisely do we mean by SKI-RUNNING ?

SKI-ING may be defined as the art of moving on ski. *Ski-ing* is a generic term for all ski-ing movements. These ski-ing movements may be divided into three main classes :

SKI-RUNNING, or downhill ski-ing.

SKI-LAUFING, or ski-ing along the level and uphill.

SKI-JUMPING, which needs no definition.

STICK-FREE AND STICK TECHNIQUE

Before defining the characteristics of first-class ski-running it is necessary to state briefly the rôle played by the stick in ski-running.

By common consent the first-class ski-runner must have mastered the stick-free technique, that is, the art of controlling speed and direction without assistance from the sticks.

He must also master stick-technique, that is, the art of getting the best possible value out of the sticks when he so desires.

We cannot proceed to consider racing in general until we have briefly analysed the rôle played by stick and stick-free technique in the various races.

The langlauf is the best possible school for that stick technique which is the basis of ski-laufing, and also of such stick technique as is of occasional value in ski-running. It is in no sense a school for stickless technique for reasons explained in Chapter I.

Stick-riding and stick-dragging, which might be generically classed as *stick-running*, are forbidden—under British racing rules—in straight racing,[1] slalom racing and no-fall racing. These races are therefore excellent as a test of the stick-free and useless as a test of the stick-running technique.

In cross-country races the above restrictions always apply to at least two-thirds of the course, but British ski-race rules permit sticks to be used for a specified portion of the course not exceeding one-third of the entire course in vertical height. Such a race, therefore, is a very complete test of both stick-running and stick-free technique, more complete

[1] Downhill racing, as already explained, is a generic term which includes both straight and slalom racing.

indeed than either the langlauf or the straight race, the former of which encourages stick-running but discourages stick-free, and the latter of which puts a premium on stick-free and excludes stick-running technique.

So much for sticks. In the discussion that follows I must be understood to be referring to ski-running in the stick-free style unless the contrary is stated or implied.

THE CHARACTERISTICS OF FIRST-CLASS SKI-RUNNING

First-class ski-running is a matter of speed, steadiness and judgment.

SPEED. This comes first, for high speed is impossible without perfect steadiness and good judgment, whereas it is easy to run very slowly and yet very steadily.

"The *sine qua non* of fine ski-running is speed" (Vivian Caulfeild in *How to Ski*).

STEADINESS. "Schneider insists on perfect steadiness as a *sine qua non* of decent ski-ing" (Vivian Caulfeild, *B.S.Y.B.*, Vol. IV, p. 395).

Precisely. Speed is the hall-mark of *fine* ski-ing, "absolute steadiness" of *decent* ski-ing.

JUDGMENT. First-class ski-running is almost as much a matter of the head as of the legs. Snowcraft is essential, for the first-class ski-runner must diagnose snow while travelling at a high speed and recognize at a glance the slightest change of texture and pace in the varying snow surfaces over which he travels. If his snowcraft is at fault he will fall when the snow changes suddenly from slow to fast or from fast to slow. Judgment, again, is necessary for the choice of line. On open slopes the ski-runner must decide rapidly whether he can run straight and, if not,

where to place his turns, which are used less to change direction than to reduce speed; in other words, on open slopes such a change of direction is a regrettable necessity dictated by inability to hold the pace rather than, as in the case of wood-running, by geographical conditions.

A man who is not an accurate judge of distance may make a good show on open slopes, but among obstacles a good eye is essential. The first-class ski-runner must be able not only to turn at high speed where he has a wide margin of open slopes in which to manœuvre, but also to prove that he can place his turns "at the orange," to quote a skating expression. Ski-ing on open slopes might be compared to skating on an open rink; ski-ing among obstacles to combined skating in the English style.

To shoot narrow gaps between fences or trees, to turn continuously at high speed in a difficult wood is clearly more difficult than to run well in the open. To sum up, JUDGMENT in ski-running may be sub-divided into judgment of snow, judgment which consists in choosing a good line in the open and judgment which consists in choosing a good line among obstacles.

And to save space let us agree to describe these three types of judgment as "SNOW"-JUDGMENT, "OPEN"-JUDGMENT, and "OBSTACLE"-JUDGMENT respectively.

SKI-RACING AND CROSS-COUNTRY SKI-ING

It is important to realize at the outset that no form of race can exactly reproduce the conditions of cross-country ski-ing, mainly because racing introduces a complication which does not exist on tour,

the necessity of providing approximately equal conditions for all competitors. Hence the necessity for flags which eliminate that element of route-finding so important on tour. The langlauf, for instance, developed out of those long treks across the undulating uplands of the North. And in these treks route-finding must play an important rôle. But in a langlauf the track is first carefully prepared and flagged, and the competitors follow each other in single file along the track. It is not a little amusing that the charge of artificiality against the slalom is so often on the lips of our Norwegian friends. "Why stick flags into a slope?" they ask. "Why not race round natural obstacles?" Well, at least we leave our competitors free to choose their own route between the flags, and again, whereas the ski used in a slalom are the natural ski used in cross-country ski-ing, langlauf ski are artificial in the Alps and utterly useless except in an artificially prepared track or on the gentlest possible slopes. Again, why build jumping hills if you have such a conscientious objection to the "artificial"? There is more difference between the Olympia-schanze and a "natural" jump on tour than between a slalom and a run through a wood.

But though it is impossible exactly to reproduce in any one race all the conditions of cross-country ski-ing, a race may be a very good school for cross-country ski-ing even where, as in the case of roped racing, there is little resemblance between the tactics used in the race and the tactics used among the mountains.[1]

In this article I am concerned only with individual races, not with relay races, patrol races, etc. I must

[1] See p. 161.

refer my reader to my *History of Ski-ing*, pp. 294–297, for a criticism of the roped race, to *Ski Notes and Queries*, iii, 298, for an article on the patrol race, a very interesting form of which was invented by the Eagle Club of Maloja.

The origin of the Bedford Russell Challenge Cup, which encourages field jumping (Geländesprung), is described in the *History of Ski-ing*, p. 297.

And now at last the ground is clear to analyse the various races in relation to ski-running.

THE LANGLAUF

THE LANGLAUF is the best possible school for and the best possible test of ski-laufing. It is also the worst possible school for and the worst possible test of ski-running. As a TEST of ski-running the langlauf is clearly valueless, for the good reason that in the course of a langlauf the total time spent in ski-sliding is anything from twenty to fifty times as long as the time spent in ski-running. A Marathon racer might complete his race by sprinting the last hundred yards to the finishing posts, but nobody would maintain that a Marathon race was a good method of determining which of two competitors was the better man in the hundred yards.

The langlauf tests neither snow craft, stickless technique, downhill turning, nor judgment in choosing a line (see also pp. 7–8).

STRAIGHT RACES (DOWNHILL RACES)

The downhill race, as it is still often called, or a straight race, to quote its official name, is not only the finest test of SPEED in ski-running but also of

STEADINESS. On a properly set course falls waste time, and as races cannot be won by wasting time, the racer either learns not to fall or fails to win races.

So far as judgment is concerned, SNOW JUDGMENT may easily be decisive in late February or early March, but in mid-winter snow judgment seldom plays a very important rôle.

OPEN JUDGMENT is tested in every straight race, for even though the most direct route may be flagged, judgment and choice of line are still necessary to decide which slope shall be taken straight and where such turns as are necessary are to be placed.

OBSTACLE JUDGMENT is less easily tested in a straight race, as it is difficult, for reasons explained below, to include obstacles in a straight racing course. This defect in straight racing is remedied by slalom racing. The British system of awarding the ski-running championship on the combined result of a straight and slalom race is the ideal method of selecting the best all-round ski-runner.

Opponents of straight racing are now reduced to asserting that a straight race is dangerous, which is untrue, or that the local runners have an advantage, which is of course undeniable. But the advantage of local knowledge is less marked in the case of a racing course than a jumping hill, and can always be neutralized if the course for a championship is open to practice a week before the race.

The virtues of straight racing as a SCHOOL for ski-running are patent to all who have ever raced and indeed to every observant frequenter of a racing centre.

The fear of speed is the main difficulty in ski-ing, and the best way to conquer this fear is to race. In the thrill of a race you will find yourself taking slopes

straight which you had never dreamt of taking straight before. The sight of a rival just ahead incites you to heroic efforts. That high-speed turn through a gap—impossible! Yes, impossible on a tour, but in a race you try it and get away with it. You simply can't afford to fall, for Brown is sitting on your tail. "Hold it! hold it!" you mutter as your ski leap and quiver over bump and hillock, and you DO hold it. It is not only speed but steadiness which is improved by straight racing. "Never lie down till you're thrown" may be a counsel of perfection in cross-country ski-ing, but you must act on it if you wish to win races.

Straight racing tests courage. The risk of serious injury is negligible, no greater than in jumping, but courage is a matter of emotion rather than reason, and high-speed ski-ing or jumping certainly calls for courage. Some ski-runners would rather attempt the fiercest straight run than go over a big jump; others would far prefer to try the Olympia Schanze than to point their ski down the Gadarene run on Lone Tree. Mr. Caulfeild, for instance, never felt happy on a big jump, which explains, perhaps, his rather exaggerated respect for jumping, but I have known few jumpers who could and none who have repeated his great run down the Blumenlücke, or Mr. Mackintosh's run on "Mac's leap."

SLALOM RACING

I mean, of course, slalom racing as evolved by the British, with the twin flag control, not the old-fashioned type with single flag controls which was tried out and very properly rejected in Norway and Switzerland.

Many years before the modern slalom had been invented, I explored the possibilities of racing among obstacles in order to test that " obstacle-judgment " which was inadequately tested in straight racing. But I soon realized the limitations of natural obstacles so far as racing is concerned. If a wood, for instance, is dense enough to require continuous turning, there will be a wide variation in the different lines through the wood so far as time is concerned. Luck and local knowledge will play too decisive a rôle in a race set through the wood. Even if the wood is flagged, it is so easy to miss the right line by a yard or two, and once the right line in a wood is missed it is often impossible to regain it. I know " Caulfeild's wood " as well as most people, but I have hardly ever been down the same route twice.

Rocks are more unsuitable than trees. Trees may be, but rocks are very rarely, so arranged as to force runners to do continuous turns. On tour one runs carefully among rocks, but a man who sets a racing course among rocks asks, not for the safety speed which the nature of the ground suggests, but for the competitive speed which is the essence of a race. Thus, racing among natural obstacles, so far from reproducing, actually reverses the normal conditions of cross-country ski-ing. On tour a good runner will leave a margin of a yard or so when turning rapidly among trees or rocks. In a race he is bound to shave rock or tree as closely as possible.

Fortunately the slalom provides us with an easy method of duplicating the substance rather than the accidentals of obstacle-running on tour.

Figure 11 represents a steep glade (gradient 25–30°) between trees. Theoretically the quickest line down this glade is the dotted track A 1 2 3 D.

Only a superhuman ski-runner could, and only a fool would attempt to follow this dotted line which shaves the trees at points 1 and 2 and narrowly misses a tree at point 3 after the most abrupt of stop-christianias from a straight descent at maximum speed. The line ABCD, on the other hand, is the

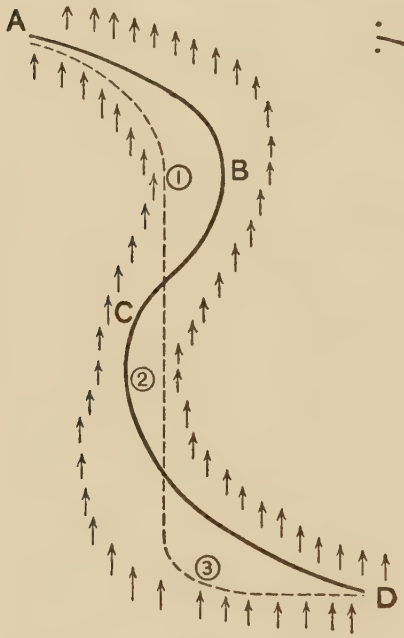

FIG. 11

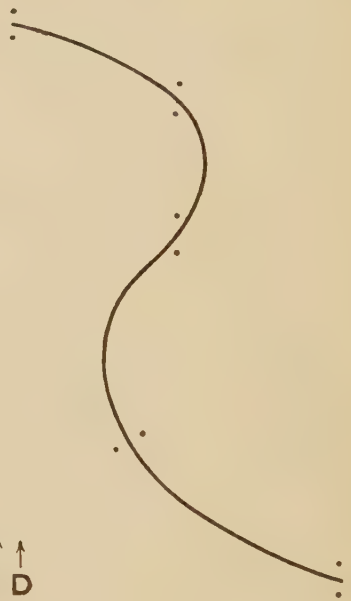

FIG. 12

line which would be selected by a first-class ski-runner, and our task is to duplicate this line in a slalom.

Though the glade is broad, the actual part of the glade available is much narrower, for, by hypothesis, we must leave a margin on each side of the glade for safety, shaving trees at high speed being excluded as unsound. In the slalom we reproduce not the glade itself but the limitations which are in effect

imposed by allowing for the margin of safety. It is obviously as difficult to shoot between two flags which can be struck with impunity if placed, say, a yard apart, as between trees which cannot be struck with impunity and which stand three yards apart. The flags as placed in Figure 12 obviously present a problem precisely similar to that represented by the glade in Figure 11.

It is easy to arrange the flags so as to test every type of turn, long and sweeping, short and abrupt. The slalom is necessary as a complement to the straight race, testing as it does that obstacle judgment and accurate placing of turns which is inadequately tested in a straight race. And the fact that a slalom calls for different qualities to straight racing is proved by results, for if the slalom was unnecessary those who excelled in straight racing would invariably excel in slalom racing. And this is far from being the case.

In the Kandahar Ski Club, for instance, only three British members are classified as slalom "alphas," whereas eight are classified as straight racing "alphas."[1] It is indeed much harder to enter the élite class as a slalom than as a straight racer.

The slalom is a test not only of particular ski-ing qualities, such as obstacle judgment, but also of a particular type of nerve. The straight race is a test of guts, the slalom of morale. Speed in a straight race acts like an anæsthetic. "Nerves" are a thing of the past once you are fairly off. But you can never see red in a slalom, never let your ski rip, never

[1] A slalom "alpha" is only eligible to win open slaloms and is ineligible for a "beta" prize. Thirty-two members of the Club have passed the First Class Test, but there are only two British double "alphas," Mackintosh and Bracken.

blind all out hoping for the best. In a straight race you are unaffected by an occasional clump of spectators. You flash by unnoticing and very probably unnoticed. But in a slalom you are in full view from start to finish. You perform a solo. The entire attention of a critical crowd is focussed on your every movement. You cannot forget the crowd, or your woes, in a fine burst of uncontrolled speed. A bad mistake may be retrieved in a straight race, but in first-class slaloms the competition is between those who make *no* mistakes. Of these the fastest wins. One bad mistake and you can no longer hope to win ; two bad mistakes and you finish among the " also rans." It is this which makes slalom racing such a strain. Slalom racing demands the most rigid self-control, the most exact calculation. A shade too slow and you are out of the running ; a shade too fast and you overrun a flag. You cannot relax for a second, for the slalom demands intense concentration from start to finish.

Watch two cracks fighting for the odd half-second which will decide the fate of a slalom race. Neither looks like making a real mistake. No hint of a stumble, much less a fall. For the greater portion of the course there is nothing to choose between them. And then, perhaps, at some unusually tricky flag, whereas one flashes through on a fluent continuous high-speed curve, the other slightly over-edges his ski, checks just a little more than is necessary, and the snow spray which spurts up under the checking ski is a symbol of the half-second which he has lost—and with that half-second the race.

The speeds attained by experts are extremely high. In the Arlberg-Kandahar (1929) the winning time for a descent of 530 feet was 56·8 seconds. There

THE ROBERTS OF KANDAHAR RACE, 1930

[illegible] PHOTOGRAPH IS TAKEN JUST AFTER THE START. THE FIRST TWO HUNDRED YARDS ARE RUN UP A "SWITCHBACK STREET"

FOR THE SLOPE IS GENTLE AND THERE IS AMPLE SPACE

were about thirty pairs of flags. This works out as 1 minute 47 seconds per thousand feet of vertical descent, quite a good " straight racing " speed.

To place your turns with such accuracy while travelling at the highest possible speed demands not only perfect control of your ski but of your mind. Self-control is the key to slalom racing.

And as accurate turning at high speed is the key to cross country ski-ing on obstructed ground, it is unnecessary to insist that the slalom is the finest possible school for such ski-ing. Bracken improved his cross-country ski-ing, so he tells me, a hundred per cent by devoting day after day to a practice slalom, down which he timed himself until he had doubled his slalom speed and thereby, as he found, doubled his speed among natural obstacles on tour.

The slalom, again, is not open to a serious disadvantage of both straight and no-fall races. In these races it is impossible to exclude the competitor who has practised over the course and who knows every inch of the ground, for the number of possible courses in any centre is limited and the local runners can therefore explore any course that is in the least likely to be chosen. Now, every slalom race represents an unknown course, for the setter can vary the curves at his will and can, in effect, produce conditions similar to those of ski-ing through a wood unknown to all the competitors. You cannot, as in a no-fall race, practise down a course till you know exactly what slopes can be taken straight. The slalom tests, and no-fall racing does not test, your ability to decide how fast you can turn, in UNREHEARSED conditions, without falling.

The stupidest of all criticisms to which the slalom is exposed is the criticism that it is such a SHORT

race. A slalom course takes about six times as long to run as a hundred yards race, and about twenty times as long as a jump on the Olympia Schanze. And yet the jump, which is a matter of seconds, ranks equally for the combination with the langlauf.

Finally, the slalom, we are told, is unsuitable for international events because a slalom with more than a limited number of entries becomes unmanageable. I admit the premise. I deny the conclusion. Tennis is not considered unsuitable for international competition because there is no room for you and me at Wimbledon. For international events we must devise some standard of entry qualification which will exclude all but the real cracks. In an event decided on the combined result of a downhill and slalom race, the slalom might well be restricted to the first twenty, thirty or forty, as the case may be, of those that finish in the downhill race.

If a slalom is held on a north slope any time before March, fifty competitors is about the maximum that can be comfortably managed if every competitor is to be allowed two runs down the course. There were over fifty competitors in the S.A.S. Slalom at Mürren in 1929 and there was no hitch in the proceedings.

If a slalom is to be run on a south slope any time after the middle of February, an entry of 20–30 is about the limit if the snow conditions are to remain virtually the same for all competitors.

CROSS-COUNTRY RACES

A cross-country race is a race in which the amount of uphill and level ski-ing is limited and in which stick-riding may be permitted on a defined portion of the course.

The straight race and the slalom test ski-running but do not test ski-laufing. They test stick-free but do not test stick technique. The cross-country race was evolved in order to test in the *same* race ski-running and ski-laufing, stick and stick-free technique.

So long as the distance climbed in a race equals the distance descended, ski-running is practically without effect on the result owing to the vast difference between the time spent in running and climbing. In order to give the ski-runner and the ski-laufer an equal chance, you must equalize not the *distances traversed* up and downhill respectively, but the *times spent* in climbing and descending. This means, in effect, that for every hundred feet of climbing there must be at the very least 1000 feet of downhill ski-ing.

A cross-country race differs from a langlauf in that the rules restrict the ski-laufing sections by the condition that these must be arranged so that the aggregate times spent on them does not exceed the aggregate time spent on the downhill portions. In the langlauf the scales are hopelessly weighted against the ski-runner. In the cross-country race ski-runner and ski-laufer start fair.

Similarly, in order that stick technique may be tested no less than stick-free technique, stick-riding may be permitted on a portion of the course, the vertical height of which must not, however, exceed one-third the total vertical height descended in the race.

A cross-country race is, therefore, a magnificent all-round test of technique. Indeed, the " Inferno " cross-country race, annually held at Mürren, provides a more complete test of the various forms of ski-ing technique than any race that has yet been held.

The "Inferno" course is from the summit of the Schilthorn (9817 feet) to Lauterbrunnen (2615 feet). The course includes a fair amount of uphill and level ski-ing, so that ski-laufing is adequately tested no less than ski-running.

The sections which are level, very slightly uphill, or slightly downhill, total up to about two miles in length. There is about 300 feet of climbing, so that the total aggregate descent is not far short of 7500 feet.

Stick technique is thoroughly tested on the last section of the course, the run down from Grütsch to Lauterbrunnen, a vertical descent of 2500 feet. No more difficult ground has ever been chosen for a race than this section of the "Inferno" course. A short belt of dense wood, narrow paths, steep and narrow glades and continuous high-speed turning through gaps and fences, all combine to make the Grütsch run a joy to experts and a magnificent test of ski-ing. In the "Inferno" race stick-riding is allowed on this section. In the "Arnold Lunn" stick-riding is allowed only on the path and through the wood.

Ski-running, ski-laufing, stick and stick-free technique are all tested in the "Inferno" race. Judgment is tested more than on short courses, for the good reason that it is impossible to rehearse a course of this length in the same detail. Nobody knows the "Inferno" course by heart.

Our Norwegian friends labour under the quaint illusion that we advocate downhill and slalom races because we are too feeble to train for the virile and manly langlauf. I should be extremely surprised if many Norwegians could beat Mr. J. Riddell's time for the "Inferno" course (45 minutes), and I am

inclined to believe that Norwegians who have done well in langlaufs at home would agree that the "Inferno" race is in its way almost as exhausting as an 18 kilometre langlauf.

Of course, if you treat the "Inferno" not as a race but as a tour and decide merely to cruise down the course, there is no reason why you should train for the event. The same applies to the langlauf. But to race full out down the "Inferno" course is a very searching test of training and of stamina. Continuous downhill running at high speed is a very great strain on muscle and on the nerves. Even at the end of a short race competitors arrive in a state of complete exhaustion. The theory that an untrained man has the least chance of winning even the shortest of downhill races against well-trained competitors is a complete illusion. Now, if continuous fast running for 1500 feet is a strain, it is obvious that the "Inferno" course, which begins with nearly 4000 feet of continuous running and concludes with 2500 feet of continuous and intensely difficult running, is a test of stamina severe enough to satisfy even the most exacting of critics.

Might I add in conclusion that though I am erroneously supposed to be biased against the langlauf, I attach so much importance to the technique of ski-laufing that my own cup, the "Arnold Lunn," is awarded for a cross-country race which includes uphill and level sections and which is therefore a good all-round test not only of ski-running but also of ski-laufing. The course for this race is from the top of the Allmendhubel to Lauterbrunnen and includes the difficult Grütsch-Lauterbrunnen section of the "Inferno" race.

NO-FALL RACING

The no-fall race was invented by Mr. Caulfeild, who hoped that the no-fall race would test the competitor's " safety speed " rather than his racing speed. The straight race, so Mr. Caulfeild maintained, is an index of a ski-runner's straight-running speed. The no-fall race is an index of his sound cross-country speed. Mr. Caulfeild expected that no-fall races would be won by men who could never hope to win straight races, and that many straight-racing experts would prove useless at no-fall racing.

He was mistaken. The straight-racing stars shine with equal brilliance in no-fall racing. It has been proved beyond argument that a man who is good enough to distinguish himself in first-class speed races will do equally well in no-fall races.

Moreover, no-fall races do not test " safety speed," whatever that may mean. Good racers treat a no-fall race exactly as if it were a speed race. They go all out ; they strive to avoid falling whether they are straight racing or no-fall racing, for a fall in the former will probably, and in the latter will certainly, lose the race. Every competitor knows that the majority of the competitors are determined to go as fast as they can and that some of them, at least, will reach the finish without a fall. It is therefore useless to try to win by adopting safety tactics which, in consequence, will only be adopted by competitors who have abandoned all hope of winning, and are content to finish reasonably high up in the list.

The record for the Maulerhubel course at Mürren and for the " Bumps " at Wengen has twice been broken in no-fall races. Now, if a man can lower the record in a no-fall race it is obvious that intentional

falling will not pay. And indeed racing results of recent years have proved that Mr. Caulfeild's bogey, the intentional fall, never wins races, and that good racers make every effort to stand, knowing well that a single fall, especially in soft snow, will probably lose them the race, and will certainly lose time.

The whole question of no-fall races is discussed at length in the *British Ski Year Book* (Vol. V, pp. 86 *et seq*).

But though straight racing and slalom racing remain the only sound methods for sorting out first-class ski-runners, the no-fall race is invaluable as a training for second-class runners. The second-class runner will learn in no-fall racing exactly how fast he can run without falling, knowledge which he will acquire in a much more accurate and reliable form than in ordinary touring. No-fall racing will teach him to resist a fall to the last, and not to lie down merely because he is out of control. Straight racing teaches the same lesson, but there is an even greater inducement to resist a fall in no-fall than in straight racing. A no-fall racer usually begins by crawling, but he soons learns to adopt speed-racing tactics. When he reaches this stage he will often find himself out of control, heading for what appears to be an inevitable crash. If he holds on to the end, if he waits for the ground to rise up and smite him between the eyes, his pluck will often be rewarded by a complete recovery of control.

The weekly no-fall races at Mürren and Wengen have undoubtedly given a wide advertisement to the ideal of no-fall, and have contributed to raise the British standard of steadiness, just as speed racing has raised the British standard of speed. Mr. Caulfeild deserves full credit for the result of his crusade,

which is none the less valuable, even if no-fall racing has not worked out exactly according to plan.

CONCLUSION

I hope that I have succeeded in proving that the various forms of British races all serve a useful purpose in relation to cross-country ski-ing. There is indeed no aspect of cross-country ski-ing which is not developed and tested in one or other of our races. The langlauf is a fine race, but the langlauf is not enough. We need straight races, slalom races, cross-country races, and roped races, adequately to test and develop all aspects of cross-country ski-ing, ski-running, ski-laufing, stick and stick-free, and last, but not least, the technique of ski-ing on a rope. Ski-ing owes much of its charm to its complex variety, and precisely because ski-ing is a many-sided sport, no single form of race can adequately test or develop its many-sided aspects.

CHAPTER XVII

HOW TO SET A SLALOM

A SLALOM race may be one of two things: a superb test of technique or a sorry farce. Everybody realizes that practised and experienced officials alone should be entrusted with the organization of important long-distance races and jumping competitions. Nobody would ask a man who had done nothing but set slaloms to set a course for a *langlauf*, but it is too often assumed that anybody can set a slalom without any preparation or without any experience, provided he is allowed to stick a few flags haphazard into a hill-side.

Much money is spent, not only in building a jumping hill, but also in preparing a jump for a jumping competition, but few people realize that the course for a hard-snow slalom has also to be prepared and stamped down on the eve of an important competition.

In brief, experienced officials and proper preparation are necessary for a successful slalom. Do not, therefore, judge and condemn the slalom on the result of the first slalom which you or others organize at your centre. Before you try to organize a slalom, begin modestly by setting up a practice course. Persuade your friends to run down it. Induce those who are to act as flag-keepers to judge an experimental slalom and thus acquire the necessary

experience. If those who wish to initiate slalom races are willing to take the necessary trouble, a fine form of race will not be discredited merely because neither the setter nor the flag-keepers know their job.

THE EVOLUTION OF THE SLALOM[1]

The slalom in its primitive form was abandoned as a failure both in Scandinavia and in Switzerland. It was usually held on soft snow, thereby setting a premium on the luck of the draw. Marks were usually given for style, thereby encouraging mere prettiness at the expense of speed. And finally flags were placed singly, competitors being required to leave them alternately to left and to right.

The modern slalom owes its popularity to the invention of the double control flag, which enables the setter to test every variety of turn, not merely the slow symmetrical series of similar turns. Marks for style have been abolished and the luck of the draw, so far as soft snow is concerned, has been eliminated.

HOW TO SET A SLALOM

A slalom race under British rules is always run in two parts. The first part must be on hard snow and the second part may be on soft snow. It is always possible to make certain of hard snow, but soft snow may be unobtainable, in which case the slalom will consist of two hard-snow courses.

Soft-snow slaloms are perhaps unsuited for first-class competitions with a very large entry of first-class

[1] The evolution of the slalom is fully described in *A History of Ski-ing*, by Arnold Lunn. (Oxford University Press, Amen House, Warwick Square, London, E.C.4.)

runners all very equal in performance. All slalom races under International Racing Rules are held exclusively on hard snow.

The order of starting for the first part is determined by lot, and for the second part by the order of finishing in Part I. The competitor who does the best time in Part I has the choice of position in Part II. He need not necessarily start first in Part II. He may elect to start second. The order of starting for the other competitors is similarly determined by the order in which they finished in Part I.

Part I being held on hard snow, the snow conditions are normally the same for all competitors, and therefore the luck of the draw should not influence the result. In soft snow the order of starting is of very great importance, and the unpopularity of slaloms in the past was largely due to the fact that they were usually held in soft snow and the luck of the draw played a far too important rôle in the ultimate result. Under British rules the privilege of enjoying comparatively untracked snow in Part II is a privilege for which the competitors contend in Part I, and is the reward not of a lucky draw but of merit. If both parts are on hard snow, the order of starting is the same in both parts.

PREPARATION OF THE HARD-SNOW COURSE

As the order of starting on hard snow (Part I) is determined by lot, it is obviously essential that all competitors should enjoy virtually the same snow conditions in Part I.

The snow should therefore be really hard. After a snowfall a great deal of time and trouble is necessary thoroughly and effectively to stamp out a

hard-snow course. The course should be prepared on the day before the race, as fresh snow which has been stamped down requires twenty-four hours to settle down properly. Where the snow is hard, but not quite hard enough, the rules permit the flag-keeper under the direction of the referee to fill in any holes caused by a competitor, in order to equalize conditions.

In stamping out a hard-snow course the flags should be put in first. This saves a great deal of time, as it is then only necessary to stamp out the snow in the neighbourhood of the flags. A wide margin should, however, be left in order to prevent competitors running off and doing their turns in soft snow.

A well stamped-out course on a northern slope is in general preferable to a south-facing practice slope. Tracks on south slopes tend to get icy as the winter advances. Again, the conditions on a steep slope facing south tend to change rapidly under the influence of a strong sun, so that the first man down the course may have to cope with icy crust, whereas the last man may be running on easy, semi-melted crust. Such a rapid change is, of course, unlikely in January, but is common in February.

CHOICE OF A SOFT-SNOW COURSE

It is often extremely difficult to decide whether there is sufficient soft snow to hold the soft-snow part of a slalom race. If a superficial layer of soft snow to the depth of two or three inches is resting on breakable crust underneath, or—as sometimes happens at the beginning of a very dry winter—on grass, the element of chance is likely to play too important a rôle in the race. Snowcraft is of no

assistance in attempting to diagnose the condition of an old surface which is covered by two or three inches of fresh snow. The competitor who strikes a stone, or a small rock, or an underlying patch of bad, breakable crust covered by soft snow, may be unjustly deprived of all chances of winning. In such cases it is best to hold both parts of the slalom on hard snow.

LENGTH OF THE COURSE

Slalom courses are as a rule too short. It is troublesome to stamp out a long hard-snow course, and so the hard-snow part is generally the shorter of the two. A very short slalom is a mistake. Even the best of runners may blunder, miss a flag and have to climb back a few yards. In a short slalom such an error is usually decisive, whereas on a really long course it is often possible to retrieve one bad mistake. For really important fixtures 500 vertical feet should be regarded as the minimum.

The rules permit two hard-snow courses to be set, and this alternative should be adopted if it is impossible to stamp out a course of the required length.

GENERAL PRINCIPLES

A slalom race should be the supreme test of a man's power to ski at high speed among obstacles, and as obstacles in a state of nature are never arranged in nice tidy patterns, the symmetrical type of slalom which was once fashionable bears no conceivable analogy to the demands of cross-country running.

When the general standard of ski-ing was still low

a competitor who could run down the type of slalom course shown in Figure 13, without falls or kick-turns, was an almost certain winner, and in those prehistoric days this embryo, from which the modern slalom

FIG. 13
An old-fashioned Slalom

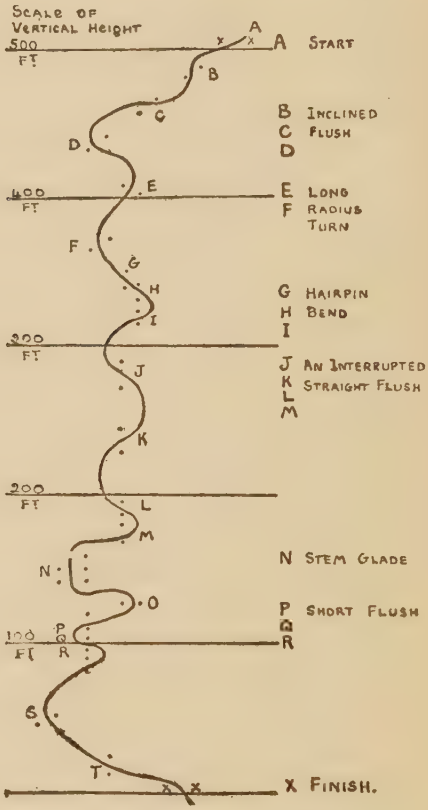

FIG. 14. A modern Slalom

course has developed, was no doubt sufficiently exacting.

But, of course, this type gives no advantage to the first-class runner. The flags are set, not where it is least, but where it is most convenient to turn. Any modern second-class runner could descend such a

course without a stumble. A course of this description would not weed out the first-class from the second-class runners. It would merely show whose ski were the fastest.

A first-class runner does not confine himself to easy turns from gradual traverses. He can turn at high speed and he can start a turn from a steep fast traverse or direct descent.

Figure 14, a typical example of a modern slalom course, will effectively discriminate between first and second-class performers. Only a man who had mastered every variety of turn, short and sharp, long and sweeping, "S" turns and drop-and-check turns, could run down this course in flawless style. The flags are not arranged where the average good runner would naturally turn, thereby placing judgment at a discount, but they are so arranged that few, if any, competitors could possibly follow the ideal track shown in the diagram. Consequently every competitor will be forced to work out his own individual tactics and to adapt these tactics to the speed at which he feels competent to turn.

So much for general principles. Let us now examine in detail the stock-in-trade of slalom artifices which enable an expert slalom setter to provide competitors with a course which combines speed and variety, and which will penalize the timid and reward the bold.

Slalom racing has evolved its own terminology, and no excuse need be offered for using the slang terms which have come into current use.

BLIND AND OPEN FLAGS

A slalom course is defined by *pairs* of flags, and competitors must pass through each pair.

Time alone is the deciding factor in *first-class* slaloms. There are no marks for style and no penalties for

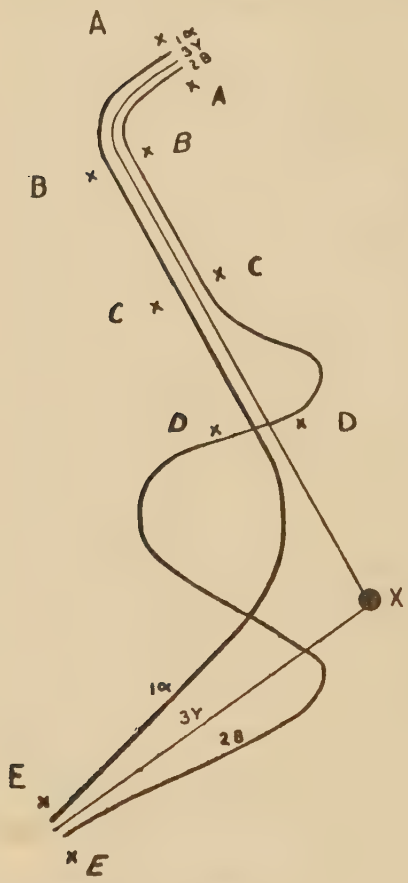

Fig. 15. Open Flags

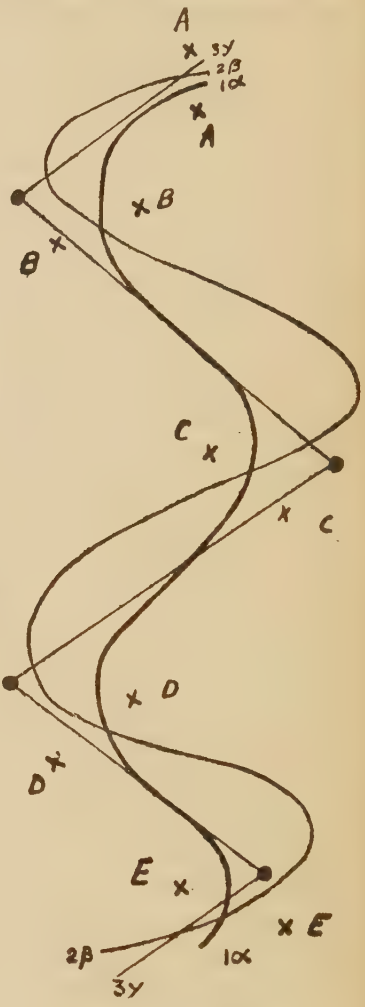

Fig. 16. Blind Flags

falls. It is therefore important to set a course which will give no advantage to the man who falls intentionally. A ski-runner who has mastered the art of the neat collected fall, in which the ski are

kept together and swung round as the ski-runner falls so as to point in the required direction, need waste very little time before he is up and off again. He will not, of course, gain any advantage over the first-class expert who takes the ideal line without falling, but he may easily score as against a slightly less expert runner who cannot turn at the highest speed demanded by the course.

Fortunately the man who specializes in the intentional tumble can easily be discomfited by the device of " blind " flags.

A pair of flags is said to be " open " when they are roughly at right angles to the shortest line from the preceding pair, and they are said to be " blind " when they are roughly parallel to this shortest line.

In Figure 15 the flags are all " open." Assume that the average gradient is about 25–30°, and that the vertical fall between B and E is about 100 feet. The intention of the slalom setter is obvious. He has set the flags to place a premium on the long-radius high-speed turn. On a steep slope and on fast snow a man must be a first-class runner to run this section of the course in one long turn.

Let us assume that there are three competitors, Alpha, Beta and Gamma. Alpha is a first-class expert and his track is numbered " 1 " in the diagram. He carries out the intentions of the setter and obviously covers the distance between flags A and E in the briefest possible turn. Beta is a good runner, but not quite good enough to emulate A, so he puts in two extra turns at fair speed and gets down without a fall. Gamma is not as good as Alpha, but he is wilier (or perhaps a worse runner) than Beta. He takes three pairs of flags in one straight line with

the intention of falling at a carefully selected spot. He falls neatly and compactly—for an intentional fall is always far less wasteful of time than an unintentional spill—is off at once, and arrives at E, having covered the distance between A and E in two straight runs interrupted by a momentary pause where he sat down. The straight runs will have taken very little time if the slope is steep, and it is clear that Gamma will do a much better time than Beta. This is all wrong, for Beta has skied well and Gamma has skied abominably.

In Figure 16 the flags are "blind." The line between each pair of flags is roughly parallel to the shortest line from the preceding pair. It is obvious that it is no longer possible to run through two pairs of flags in a straight line. Assume that the same three competitors enter. Alpha (track No. 1) has still an obvious advantage over Beta (track No. 2) and Gamma (track No. 3), as is only right and proper, but Gamma no longer scores over Beta. In Figure 15 Gamma ran straight through four pairs of flags without one turn and arrived at his goal at the expense of only one fall as against the three turns put in by Beta. In Figure 16 Gamma has to average one fall per pair of flags if he wishes to avoid turns.

The blind flag system has been found by experience to be the best method of penalizing falls.

VARIOUS TYPES OF TURNS

A slalom should test the ski-runner's mastery of the various degrees of turns. By this we do not mean the different types such as telemark, christiania, etc., but the different forms, e.g. short radius, long radius, check turns from a direct descent, and so forth.

The difficulty of a turn depends not only on the radius of its curve, but also on the speed at which it is attempted and the steepness of the traverse from which it is attempted. This is obvious enough, but it is not always realized that the difficulty of a turn also depends to a great extent on its position in relation to the turns which precede or follow it.

Figure 17 illustrates the commoner forms of turn. 17*a* shows short sharp turns connected by long gentle traverses. This is a very easy form of turn. 17*b* is much more difficult, the short sharp radius turn from a fast steep traverse. 17*c* is a succession of

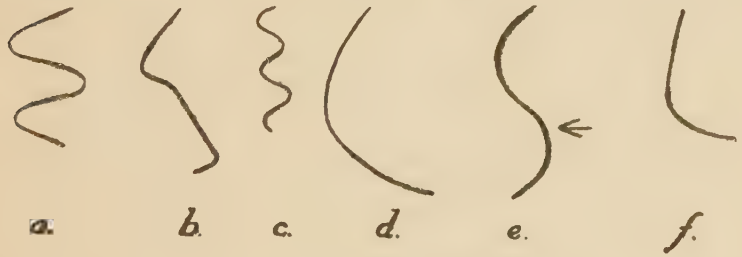

FIG. 17. Various Turns

short sharp radius turns following each other very rapidly with no intervening traverse. This again is a difficult manœuvre, especially when the turns have to be done through flags. 17*d* is the fast long-radius turn. If this turn is done on an open slope without the necessity of passing through flags, its difficulty is mainly imaginary, " for," as Mr. Caulfeild observes, " the speed, however high, is uniform throughout, and it is only change of speed, not speed *per se*, that need upset one. This sort of turn is, in fact, notoriously the mark, not of the expert, but of the beginner who—voluntarily or otherwise—can often accomplish it successfully at quite high speed long before he has skill enough to manage a

sharp turn of any sort, however slowly." We must not, however, overlook the fact that the runaway turn of the beginner would not be an easy manœuvre if the beginner had to end, not where his skis naturally came to rest, but at a given point between two flags.

Again, though it is fairly easy to hold a long-radius turn until the skis ultimately swing round to rest, it is

Fig. 18. Long Radius-turn

Fig. 19
A Short
Flush

very difficult to connect two long-radius turns interrupting the first turn while the skis are still travelling at high speed and before they have swung round completely. The arrow in 17*e* points to a part of the curve where the runner will still be moving at a high speed. If he wishes to start a new turn he must change the position of his leading leg and readjust his balance to a curve in precisely the opposite direction. Here again it is the relation of one curve

to the curve which just precedes it which is the difficulty, and the arrangement shown in Figure 18 effectively discriminates between the expert and the second-class runner, for if the slope is reasonably steep, and the distance between the flags reasonably long, only an expert will be able to follow the line indicated by the heavy track in the figure. A second-class runner will be reduced to following a track similar to that indicated by the dotted line in the diagram.

Finally, 17*f* represents a sharp uphill turn from a direct descent.

Let us see how a course can best be set to test these various forms of turn. 17*a* is obvious and needs no further explanation. 17*e* can be tested by the arrangement of flags as shown in Figure 18.

The turns shown in 17*c* provide another illustration of the fact that the difficulty of a turn depends largely in its position in relation to preceding or subsequent turns. Short sharp turns connected by long traverses as in 17*a* are not difficult, but a rapid succession of short turns are extremely puzzling. The 17*c* type of turn is best tested by what is known as a SHORT FLUSH (Fig. 19), which is simply a straight flush with very brief intervals between each pair of flags. It is best to use different coloured flags for the middle pair, e.g. blue for flags A and C, and yellow for flags B and D. A SHORT FLUSH gives an advantage to the man who can do quick neat jump-turns. The distance between the lower flag of one pair and the top flag of the next pair should be at least four or five feet, in order to set a premium on continuous running and to penalize the competitor who merely walks through the flags and does a standing jump-turn or kick-turn.

An arrangement which gives a competitor a chance of doing successive long-radius turns or alternatively of showing his mastery of the drop and check method is known as the STRAIGHT FLUSH (Fig. 20). This arrangement has become very popular. A straight flush on a very steep slope where the flags are

FIG. 20
A Straight Flush

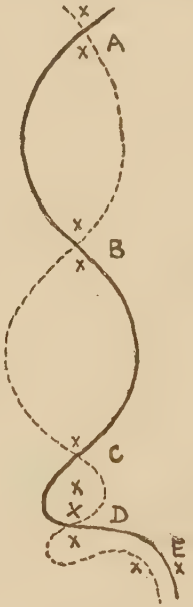

FIG. 21
Interrupted Flushes

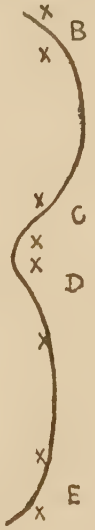

FIG. 22

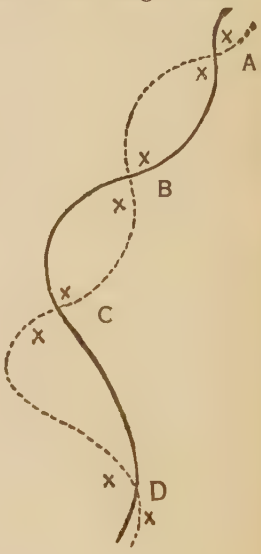

FIG. 23
Inclined Flush

separated by a considerable vertical distance is a supreme test of nerve and control. Only the boldest of runners will attempt the shortest possible line indicated by the heavy track, and even first-class runners will probably be reduced to some such track as that which is indicated by a dotted line on the diagram.

Figure 21 represents an " Interrupted Flush," an even more exacting test of ski control than an ordinary

straight flush. The narrow pair of flags at D are placed very close to the C flags and consequently "interrupt" the fast flowing line of descent. A very abrupt turn is called for. Moreover, good judgment in choice of line is at a premium. A skier who approached the top pair of flags from the wrong direction would probably end by turning through the D flags away from instead of towards the E flags, with great loss of time. A bad track of this description is shown by the dotted line in Figure 21.

The flags at E serve a twofold purpose. In the first place they insure a sharp turn at D and in the second place they prevent flag-keeping errors. Figure 22 shows an interrupted flush (similar to Fig. 21 so far as B, C, and D are concerned) in which flags E are placed vertically below flags D. Good runners will try to cut the lower flag D as fine as possible, and will often knock it down. As the pace is very high it is often very difficult for the flag-keeper to decide whether both feet have gone between the flags. The same difficulty applies in greater or less extent to the lower flags in any straight flush sequence, but the difficulty is particularly acute at the bottom of an interrupted flush unless the method shown in Figure 21 is adopted.

Figure 23 shows an "Inclined Flush" (A, B, C followed by a long-radius turn, D), a very useful arrangement indeed. An inclined flush is merely a straight flush running diagonally down the slope, but it is in many ways a more difficult test. The flowing line of a straight flush descent is at least symmetrical, and requires less accurate judgment than the varying gradient of the line through an inclined flush. Here again judgment is necessary. The dotted line shows the result of approaching the

A flags from the wrong direction with consequent loss of time between C and D.

Figure 24 illustrates a CORRIDOR and is intended to test the uphill turn from a direct descent (17*f*).

Corridors set on very steep slopes require careful thought. If the speed at E is too high, and if the slope below E is very steep, a turn that misfires will carry the ski-runner down the slope well below F.

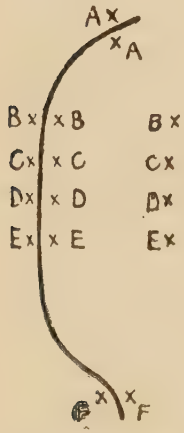

FIG. 24
A Corridor

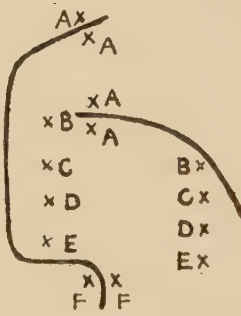

FIG. 25
A Stem Glade

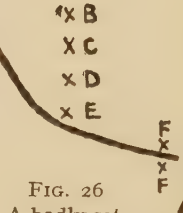

FIG. 26
A badly set
Stem Glade

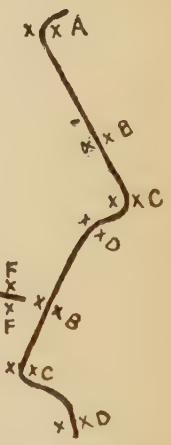

FIG. 27
An Inclined Corridor

He will then have to climb back again and lose a great deal of time. Consequently there will be a temptation to run the corridor straight and then fall intentionally just above or just below E. It is wonderful how little time is lost by a man who has specialized in neat falling.

The slalom setter must be careful not to expect impossibilities. He must proportion the length of his corridor and the sharpness of the turn to the quality of the entry, especially where the corridor ends on a steep slope.

The above reservations apply mainly to corridors which end on a steep slope. If the corridor ends on a gradual slope or on the level, there is less danger of the turn that misfires carrying the competitor far below the next pair of flags, and the corridor can therefore be made as fierce as possible. A good sharp left-handed turn after a corridor is an excellent finish to a slalom where the finishing posts are on the level.

Corridors on steep slopes are only advisable if the snow is thoroughly hard. Otherwise a banked groove soon appears at the bottom of the corridor where the competitors turn.

In second-class slaloms the corridor should be treated as a no-fall section.

A stem glade (Fig. 25) is intended to test a competitor's power to keep his speed down by double stemming. It is therefore much broader (four to six feet) than a corridor in order to allow space for double stemming. Again, the exit flags (F) are placed much higher up the slope for a stem glade than for a corridor, in order that a competitor who makes the mistake of taking the glade straight shall be carried well below the exit flags and lose time in climbing back to them. Stem glades should be set on reasonably steep slopes and should not be too long, for otherwise a competitor might save time by running them straight and falling just above the level of the exit flags. The exit flags (F) should be of a different colour to the flags at E to save confusion.

Figure 26 shows a badly set stem glade. The flags (A)—and what follows applies equally to corridors—should be more or less vertically above the exit flags (F). If placed as in Figure 27 there is

always a danger that the competitor instead of stemming down the glade may run it on a diagonal line from the left-hand flag at B to the right-hand flag at D. Note also that the flags (F) should be arranged horizontally and not, as in Figure 26, vertically, for the vertical flags (F) in Figure 26 would make flag-keeping difficult, the lower flag being in constant danger of being knocked over or cut too fine. Care is also necessary to prevent a competitor scoring by attempting a downhill turn in the neighbourhood of the D flags.

The stem glade, like the corridor, must be proportioned to the standard of the competitors. If the stem glade is too long or too steep, second-class competitors will be tempted to run it straight and take a fall. They will not lose much time as against a competitor who keeps under control. For this reason a stem glade should be treated as a no-fall section in all but first-class events.

The flag-keeper in charge of a stem glade must be extremely careful to replace the flags if knocked down exactly in their old positions. We have known the flags replaced so that it was possible by starting from the top left-hand flag to run straight down to the bottom right-hand and just get through the exit flags without a turn.

Figure 27 shows an inclined corridor which is one method of testing short-radius turns from a steep traverse (17*b*). The interrupted flush is probably a better method. The objections to the corridor when the snow is not really hard apply even more forcibly to the inclined corridor. A curving " S " corridor, which would be the result of placing a series of flags in addition to those shown in Figure 18 to restrict the skier rigidly to the heavy

line shown in Figure 18, would be interesting, but would soon produce a bob-run track in all but the hardest snow. Moreover, it would require very accurate flag-keeping and a very patient flag-keeper, for the skier, whose natural line was the dotted track, would be constantly upsetting the flags. Such devices are unsuitable for "mixed" slaloms with first-class and third-class competitors.

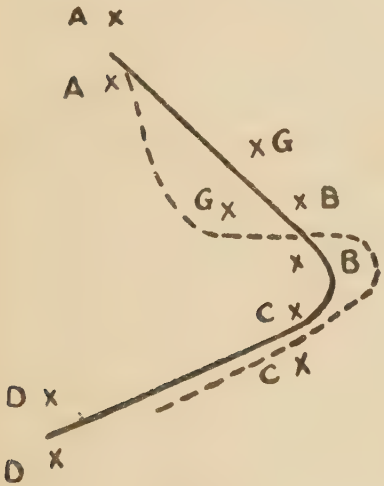

FIG. 28

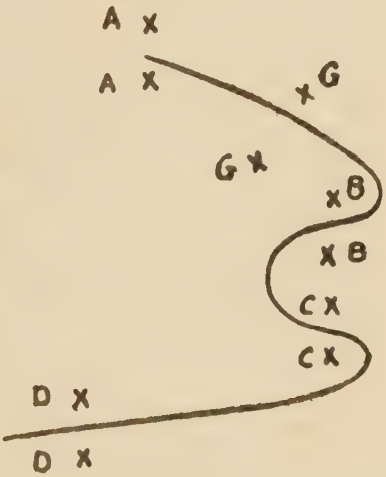

FIG. 29

A Hairpin Bend

Figure 28 shows a HAIRPIN BEND, and is another and even better method of testing the same turn. This is an excellent device, for a properly set hairpin always catches out the second-class runner and forces him to waste turns. In Figure 28 the good runner travels from A to D with only one turn. Figure 29 shows how a second-class runner will negotiate the same hairpin—three turns instead of one.

Note in Figure 28 the position of the flags (G), which are placed to guide the ski-runner into the

hairpin bend and prevent him making things easy for himself by following the course shown by the dotted line.

NO-FALL SECTIONS

An experienced setter setting a course for first-class experts can dispense with no-fall sections, but a no-fall section is an excellent feature in a slalom open to beginners or only second-class skiers. Even in crack events a setter who is in any doubt whether a fall would pay on a given section of a course, would be well advised to transform that section into a no-fall section. Slaloms for beginners should always include no-fall sections. No-fall sections are not permitted in International events run under the International rules. They should be reserved for second-class local events.

SIMPLIFIED SLALOMS

Modern practice is moving in the direction of simpler slaloms. Stem glades and corridors and short flushes are very good in second-class slaloms, especially if there is a small entry, but first-class slaloms need consist of nothing more complicated than a succession of straight and inclined flushes varied by an occasional hairpin bend.

Straight flushes can be varied indefinitely by varying the distance between the flags and by introducing interrupted and inclined flushes. This type of simplified slalom tests every type of turn, fast and long, short and abrupt.

Corridors and glades confine good and bad runners within narrow limits. If the corridor is steep enough and long enough adequately to test the experts, the

more moderate competitors will be tempted to sit down intentionally lest worse befall. Corridors get pitted with graves and have a way of ending in a banked-up miniature bob-run. Now the straight-flush type of slalom has the great advantage that the tracks of experts and beginners are widely separated. The beginner makes long gentle turns ; the expert cuts the flags closely. If the beginner falls, he usually falls right outside the possible spoor of good runners. And on such slaloms few runners are tempted to fall intentionally, for the intentional fall does not pay, even in the case of moderate performers.

A slalom course consisting of flushes and their variants wears much better than a course studded with corridors and glades. For a mixed entry varying from first to third-class competitors the simplified flush type of slalom is certainly the best.

SETTING SOFT-SNOW SLALOMS

There is a tendency to concentrate on hard-snow slaloms to the neglect of the soft-snow slalom. This is a pity for the soft-snow slalom is the more difficult of the two and the more exacting test of technique. The main objection of soft-snow slaloms, that is, the inequality of the snow conditions so far as the earlier and later competitors are concerned, can be largely eliminated by skilful course setting.

All complications should be avoided. Stem glades, hairpin bends, corridors and short flushes should never feature in a soft-snow slalom. The distance between each pair of flags, and the distance between the two flags which form a single control, should be much greater in soft than in hard-snow slaloms.

Course setting should be simplified. Straight flushes and long-radius turns (Figs. 20 and 18) are ideal for soft-snow slaloms. A course which consists solely of long-radius turns and straight flushes is a course on which only the exceptional crack will be able to turn exactly at the flags. The other competitors will all turn some distance from the flags (compare, for instance, the dotted and continuous lines in Figs. 18 and 20). Few, if any, competitors will turn on the same spot. Consequently, all competitors should be making their turns in soft untracked snow. If the flags forming a single control are widely spaced, there is no reason why the snow should be particularly cut up near the flags if the course is set as advised above.

A much longer course can be chosen than for a hard-snow slalom, as there is no need to spend time stamping out and preparing the course. Figure 30 shows a section of an excellent soft-snow slalom.

The rule which enables the referee to weed out all but a limited number of competitors is particularly useful in the case of soft-snow slaloms.

PUTTING IN THE FLAGS

Flags are often knocked down, and it is sometimes difficult to discover the original hole which they occupied. In many cases the difference of a few inches will not matter in replacing the flag, but in some cases a small difference in replacing the flag will alter the whole character of a considerable section of the course. This is particularly the case with stem glades and straight flushes. In setting a straight flush and in replacing a flag which has been knocked down, it is essential to make certain that all the pairs of flags forming a straight flush are in one

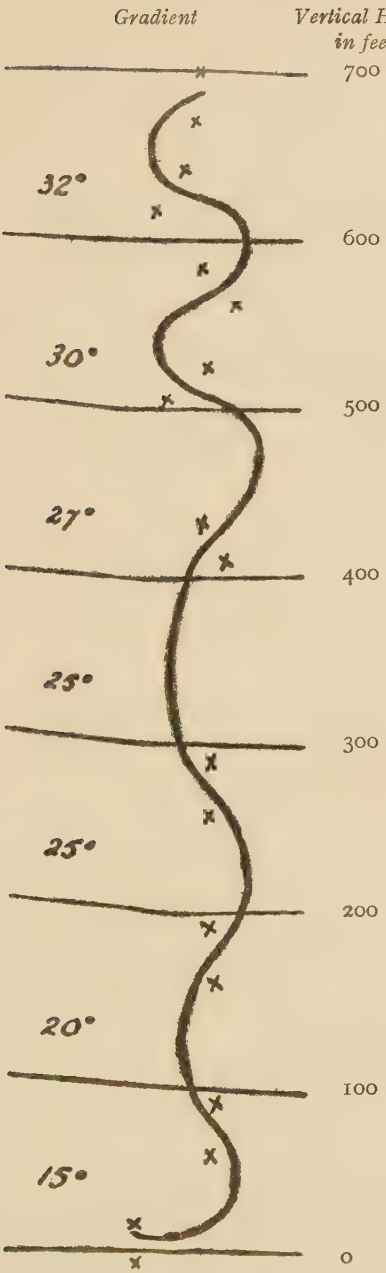

FIG. 30. A Soft Snow Slalom

straight line. If one pair is even slightly "open" to the next pair, a competitor will be able to take two pairs in one straight run without turning. This also applies to short flushes.

No really satisfactory method has yet been devised for marking the position of the holes into which the flags are placed. A rough-and-ready device is to make a hole for the flag with a ski stick. The disc on the ski stick leaves a circular mark in the snow which helps one to locate the original hole after the flag has been knocked over. The modern "Kandahar" slalom flags, which are jointed in the middle and consequently bend over, seldom come out of the snow.

TRIAL RUNS

Competitors are not allowed a trial run, but lest the first competitor should be at a disadvantage in that the remaining competitors may profit from his mistakes, the setter or the referee or some other official should run down the course in view of the competitors before the race starts.

This is very important in soft-snow slaloms, as otherwise the leading competitor may be at a great disadvantage if any part of the course is heavy. A good track will enable him to gain time, and there is no reason why the first man down should have the disadvantage of soft untracked snow on the slow parts of the course.

SUMMARY

A slalom race is a competition, not only between the individual competitors, but also between the setter and all the competitors. If they evade his intentions, if they discover easy alternatives to the

cunning traps for their undoing, and, above all, if the man who falls intentionally profits by his crime, the setter is defeated and the competitors win.

Nothing is more annoying than to set a straight flush or a short flush leaving the flags "open," so that the competitors, instead of having to turn, run straight for two or three pairs in a straight flush series. Particular accuracy is necessary in the case of short flushes if they are not to be taken straight. The final test of a well-set slalom is the order in which the competitors finish who have fallen most frequently. If the man who falls frequently beats the steady, controlled runner, the slalom is a failure. A setter should therefore keep a careful record of falls for his own information, and should not be content until those who fall, and above all those who fall deliberately, come out in their proper position at the tail-end of the list.

Study the significance of blind and open flags. Do not try to be too clever. Avoid complications until you have thoroughly mastered slalom setting. In your early stages, concentrate on simple course setting. You cannot go far wrong with long-radius turns and straight flushes so long as all your flags are blind. Corridors, stem glades, and hairpin bends require more expert setting.

And, above all, do not arrive on the scene of action half an hour before the advertised time of the race. At least an hour should be allowed if the slalom is to be properly set, and at least one good runner should accompany you to run the course in ample time for any necessary alteration to be made before the competitors arrive.

The setter's duties are at an end when the course is

set, but we have still to deal with the problem of flag-keeping. For a slalom race requires not only expert setting, but also intelligent flag-keeping.

FLAG-KEEPING

Of all officials in a slalom race the flag-keeper carries the greatest responsibility. The result of the race depends on the accuracy of his decisions.

In very important slaloms there is usually one flag-keeper for each pair of flags, but an experienced flag-keeper can often judge two or three pairs of flags which are near together.

It is the sole duty of the flag-keeper to decide whether the competitors have passed correctly through the flags for which he is responsible.

Penalties are of two kinds, " single " and " double." The penalty itself depends on the best time recorded. The flag-keeper is not concerned with calculating the amount of seconds to be imposed for a " single " or " double " penalty respectively. His job is merely to decide whether a penalty has in fact been incurred.

He should keep his eyes glued to the competitor's feet—not ski—for it is the relation of feet, not ski, to the flags which is the decisive factor.

Begin by making up your mind as to the exact position occupied by an imaginary line connecting the two flags or, rather, the holes made by the flags in the snow. As the competitor approaches, keep your eyes on this line and follow with the utmost attention the movements of the competitor's *feet.*

If both feet cross this imaginary line no penalty is incurred, even if the rear end of his ski knocks over the lower flag. If one foot crosses the line and the other foot does not, as, for instance, when the skier

runs with one foot each side of a flag, a *single penalty* must be recorded. If neither foot crosses the line but if some part of either ski crosses this line, *a double penalty* must be recorded.

The most difficult cases usually occur at the bottom flag of a straight-flush sequence. The skier starts a turn just before trying to pass through the flags. He skids through them sideways, and his lower ski displaces the lower flag. The flag-keeper should keep his eyes glued to that part of the ski immediately below the foot, and a penalty should normally be recorded if it is either the front end of the ski or the part of the ski below the boot which displaces the lower flag.

Complete disqualification is only imposed if a skier completely misses a pair of flags ; that is, if no part of either ski crosses the line between the flags. If the flag-keeper knows his job, he will not allow a competitor to be disqualified. He will call him back with a vigorous shout before he has reached the next pair of flags.

A flag-keeper has the choice of two, and of only two, answers to a competitor who asks for information. A competitor will often muddle a flag, and be in doubt as to whether he has or has not incurred a penalty. Experience has shown that a competitor will lose more by stopping to argue the point than by going straight on. Consequently the rules instruct a flag-keeper to confine himself to two answers : " Back " and " Right." He should reply " Back " if, and only if, the competitor is in danger of *complete* disqualification. He should reply " Right " even if the competitor has incurred a single or double penalty.

Penalties should either be noted in a notebook and handed to the timekeeper at the end of the race,

or announced to a particular official charged with the duty of recording penalties, or announced to the timekeeper. Customs differ, but the best plan in first-class International fixtures is for penalties to be recorded in a notebook. In other fixtures it saves a great deal of time if the penalty recorder stands half-way down the slope and collects the penalties from the flag-keepers. Much time is wasted if the timekeeper attempts to record each penalty as each competitor finishes.

No-fall Sections. These are not included in first-class slaloms. A fall incurs a *double* penalty.

FLAG-KEEPERS

It should be made quite clear which flags are judged by each flag-keeper in order to prevent a competitor being penalised for the same offence by two different flag-keepers.

The flag-keepers must be particularly careful to stand where they will not obstruct the competitor's view of the flags, and where they will not be in his way after he has passed through the flags.

Flag-keepers should not hold sticks in their hands, and should certainly not leave their sticks standing in the snow beside the flags. Again and again competitors have shot between one of the flag-keeper's sticks left standing in the snow and a flag, instead of shooting between a pair of flags. It is difficult for a competitor travelling at high speed to distinguish between a stick and a flag.

The place where most mistakes occur is at the finishing-posts. The finishing-posts themselves should be quite different from other flags. They should be at least seven feet high, in order to tower

conspicuously above any spectators or officials who may be near them. Spectators ought not to be allowed to crowd up near the flags. Flags should always have a snow background, and not a shifting background of moving spectators. If possible, the spectators should be arranged on each side of the course instead of below it, and the services of active officials should be secured to keep them back.

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